Industry & JUNE/1959

WELDING

WELDING MANAGEMENT • PRODUCTION • ENGINEERING

NEXT MONTH:
INDUSTRY & WELDING
CHANGES ITS NAME TO:
WELDING DESIGN and FABRICATION

STEVENS RICE
UNIVERSITY MICROFILMS
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ANN ARBOR MICH
WIR

SPECIAL REPORT:

RESISTANCE WELDING

PAGE 37

IN THIS ISSUE: Part II of Economics of Welded Fabrication/28 New Products Highlight American Welding Society Show/62

THE MAGAZINE OF WELDED FABRICATION

PUBLISHED BY THE INDUSTRIAL PUBLISHING CORPORATION

Timely, helpful editorial . . . read by more welding men than any other monthly welding magazine

Medium-class holder, model A-W, 14 ounces, lightest holder made to take 1/4" rods, rated 300 amps, with its long lever, and fitting the hand like a glove, is the most popular in the Jackson line.

Large class model A-5S, 21 ounces, takes 5/16" rods at 400 amps, has wider lower tong for firm grip, larger diameter handle.

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Featherlight Electrode Holders have been popular since 1944

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- Copper-alloy jaws for durability, are inexpensive, easy to replace.
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Featherlight

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For More Information Circle No. 45 on Reader Service Card.

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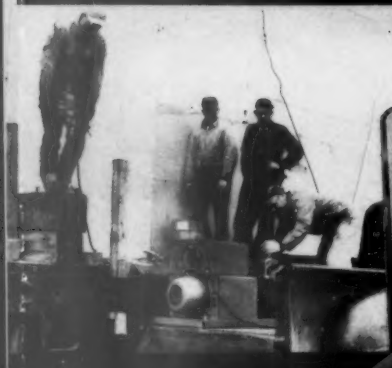
with this NEW low cost HOBART POWER/WELD

Talk about convenience—the Power/Weld supplies ample AC power to run lights, tools **while** the operator does DC welding.



Here is another typical example of how the Power/Weld saves time and money. The operator is drilling holes for lag bolts, immediately after he has finished welding a metal handrail that was broken in loading.

100% DUTY CYCLE

Hobart's Power/Weld gives you all the advantages of DC welding plus the additional benefit of AC current for operating all kinds of electric motor driven equipment.

POWER/WELD: The most profitable, compact, versatile welder you can own

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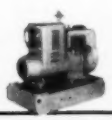
- **5 kw 110/220 volt AC emergency power**

Handle all types of electrodes in all positions. Choose either polarity (straight or reverse) for the best results on the job at hand. Famous Hobart controls give you a choice of 500 different welding heat combinations. You never have to shift jacks or change brush settings. A quiet running, air-cooled, two-cylinder engine makes you completely independent of power lines, and a 3½ gallon gas tank permits extended operations.

You can run AC powered tools that are most essential to complete your work such as a magna-flux unit, a paint spray, or a coolant pump . . . without leaving your work to make adjustments at the welder. Should a power failure emergency occur, the Power/Weld will furnish 5 KW full time AC power with excellent voltage regulation on a permanent or a "stand-by" basis. Check and mail the coupon for complete details. Hobart Brothers Co., Box HW-69, Troy, Ohio, Phone FE 2-1223.

for outside work
where electrical power is not available

Standard Gas Drive 300 to 600 amps.



"Husky Boy" 200 amps.

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Standard Electric Drive 200 to 600 amps.

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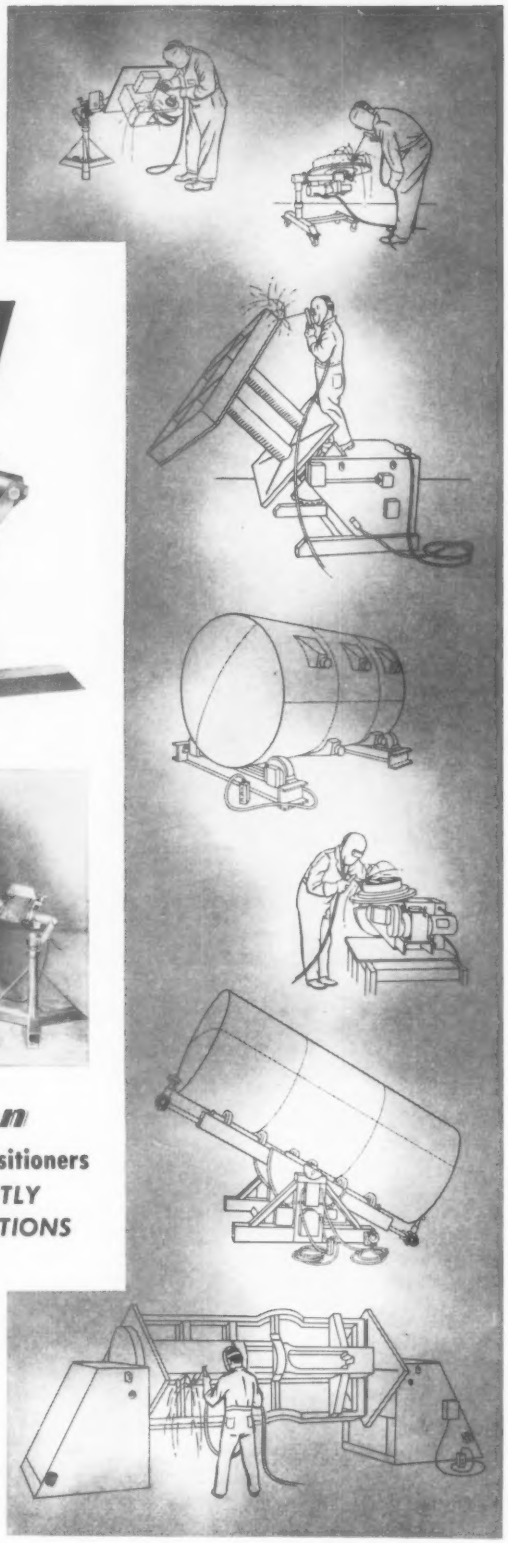
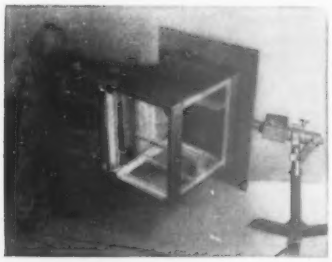
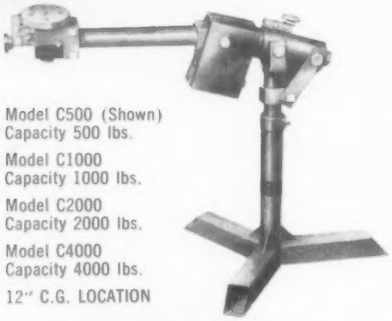


Aronson UNIVERSAL BALANCE POSITIONERS can REDUCE your WELD TIME by 50% over any other method of positioning!





Model C500 (Shown)
Capacity 500 lbs.

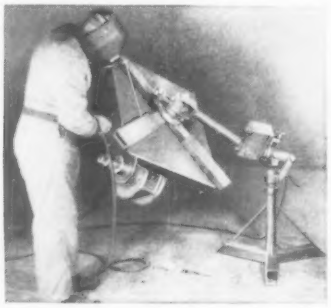
Model C1000
Capacity 1000 lbs.

Model C2000
Capacity 2000 lbs.

Model C4000
Capacity 4000 lbs.

12" C.G. LOCATION

New HIGHSPEED Electrodes *demand* Downhand Positioning



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TURNTABLES
FULLY AUTOMATIC POSITIONERS
MAGNETIC WELDING CLAMPS

Quality POSITIONERS by **Aronson MACHINE COMPANY**
ARCADE, NEW YORK

WORK WORK

For More Information Circle No. 15 on Reader Service Card.

READER'S GUIDE *June 1959 volume 32 number 6*

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John Mikulak of Worthington Corporation discusses design for weldng; he explains process adaptation and the economical use of materials.

31 **WELDING CHROME-MOLY TO CARBON STEEL CALLS FOR LOW HYDROGEN ELECTRODES.**
Warpage and shrinkage are held within 1/16-inch by good joint design and correct preheating, welding and stress relieving procedures.

32 **WHY SHOULD YOU REPLACE CASTINGS WITH WELDMENTS?**
Replacing cast parts with welded ones has helped American Pulverizer Company, St. Louis, Missouri, reduce manufacturing costs.

37 **A SPECIAL REPORT ON RESISTANCE WELDING**
A series of articles discusses equipment leasing, controls, and alloys; case histories point out the speed and economy of spot, seam and projection welding.

38 **SHOULD YOU LEASE RESISTANCE WELDING EQUIPMENT?**
An authority on the subject answers 17 questions that will help you decide if your company should lease resistance welding equipment.

40 **WHAT TYPE RESISTANCE WELDING CONTROL DO YOU NEED?**
An easy-to-understand technical discussion of the advantages and limitations of each type of control.

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Pressure-tight welds are made in thin metal sections without distortion.

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Powder metallurgy and projection welding make possible low cost, high volume production of toy train locomotive wheels.

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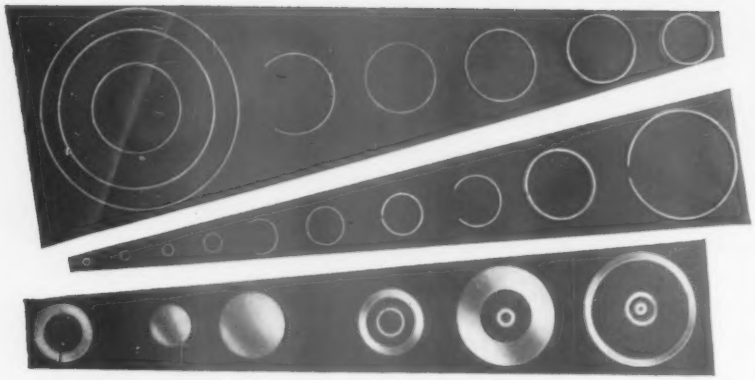

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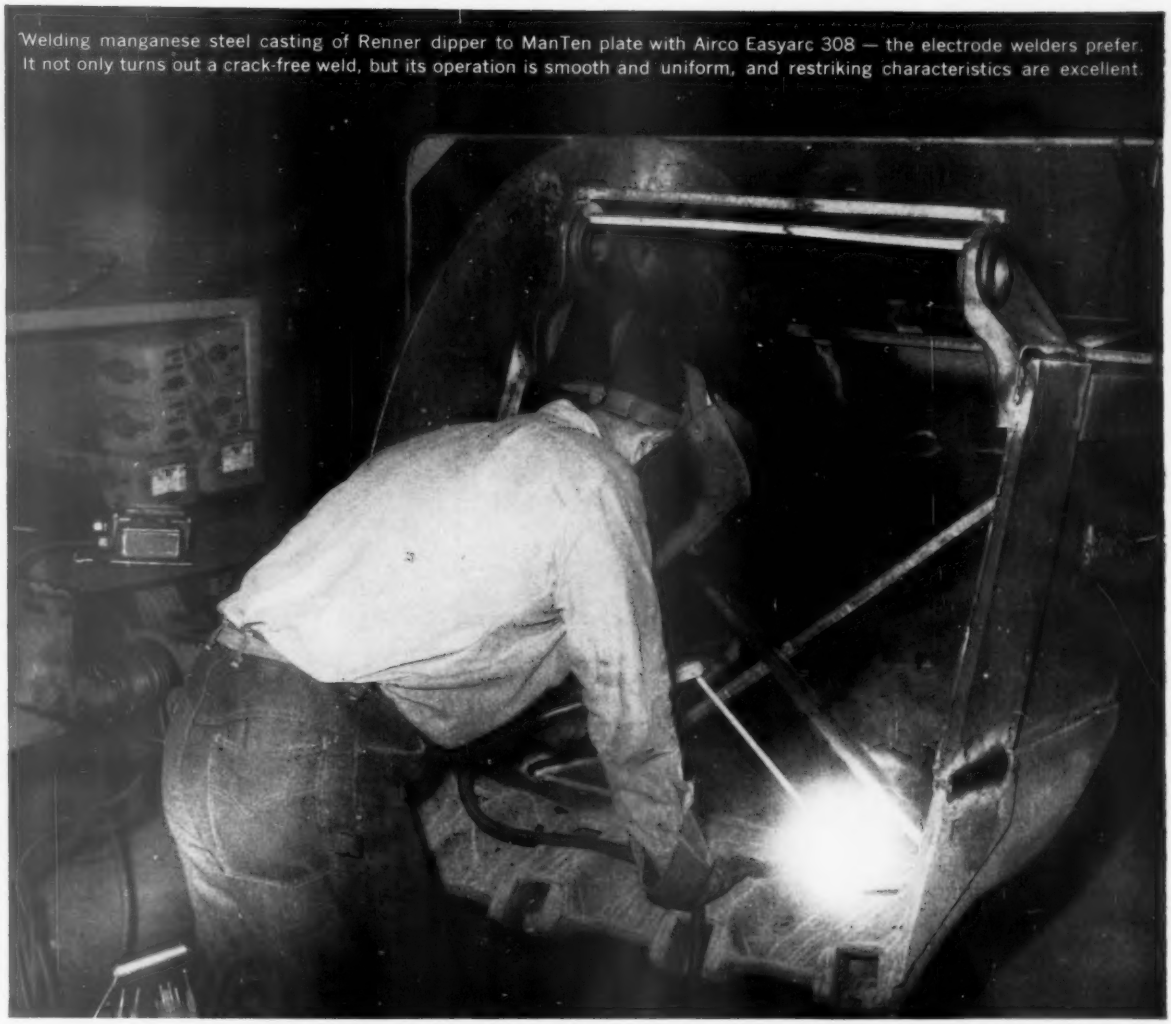

Welding manganese steel casting of Renner dipper to ManTen plate with Airco Easyarc 308 — the electrode welders prefer. It not only turns out a crack-free weld, but its operation is smooth and uniform, and restriking characteristics are excellent.

how Renner **PUTS THE BITE ON PRODUCTION COSTS** with **EASYARC 308**

Fast-growing Renner Manufacturing Company holds down the cost of fabricating Renner dippers . . . avoids the problem of preheating weldments . . . and, at the same time, produces crack-free welds. Renner uses Airco's new Easyarc 308 AC-DC metal powder electrodes.

Easyarc 308 lowers production costs because it costs less than conventional stainless electrodes. It lays down a fine looking stainless steel deposit with only a small amount of slag that can be removed easily without a chipping gun. And it delivers a high quality weld.

Other uses. On all high carbon steel applications, wherever there could be the slightest chance of cracking, Renner relies on Easyarc 308.

Do you have competition? The lower production costs possible with Easyarc 308 can help you to compete more effectively. Investigate Easyarc 308 . . . the new stainless electrode at low cost. Phone your Authorized Airco Dealer. He's listed in the Yellow Pages under "Welding Equipment and Supplies." Or, contact Airco direct. Ask for Catalog 1318.

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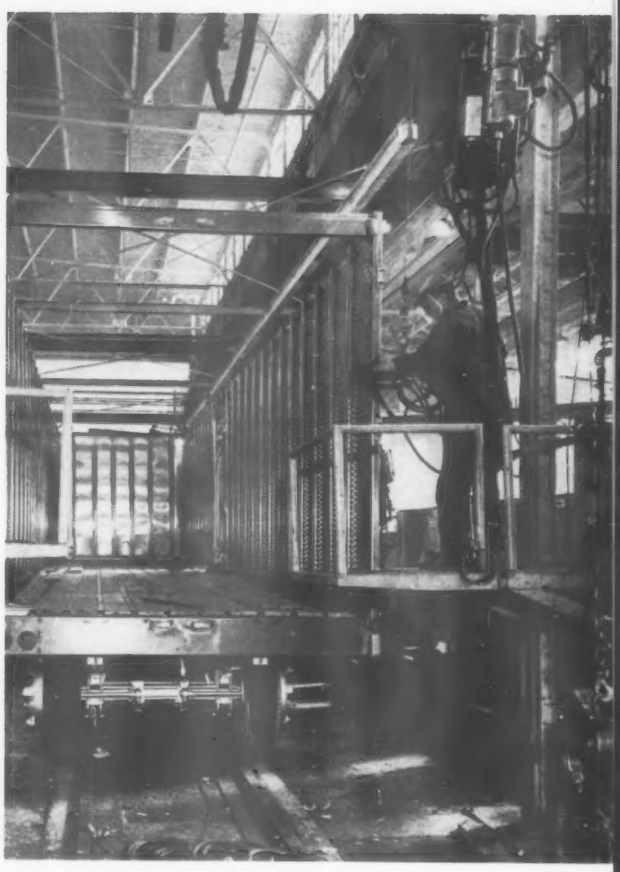
WELDING AT WORK

to do the job better and cheaper

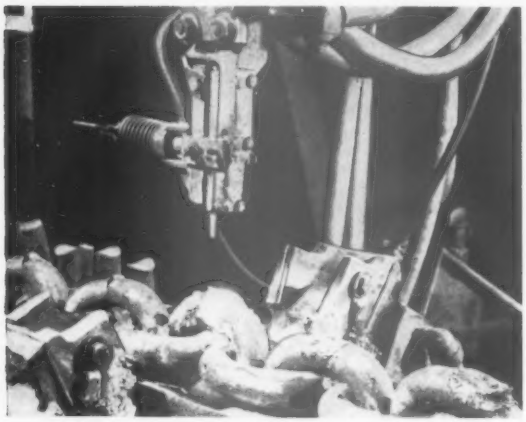
Welded trailers need no rivets, bolts nor screws

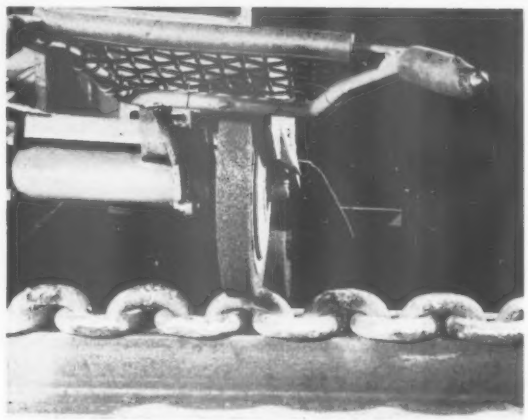


FORT WAYNE, INDIANA: Worker uses portable spot welding guns to assemble a newly designed stainless steel trailer at Fruehauf Trailer Company. The new trailer is made of Type 201 stainless, much of which is supplied by Allegheny Ludlum Steel Corp. A single medium-sized trailer uses 2,100 pounds of stainless.

The company reports the new trailer is the lightest for its strength. The exclusive unit-welded structural members are typical of the construction. Sidewall panels, siderails, cross-members and clips are welded into one super-strong unit. There are more than 7,200 welds in the average trailer sidewall. The new welded design has eliminated rivets, bolts and screws with a comparable saving in cost.

EDITOR'S NOTE: See page 46 for a report on how Fruehauf's Avon Lake, Ohio, plant makes truck trailer side panels from spot welded low alloy-high tensile steel.





Automatic welding makes stainless chain links fast

PORTLAND, OREGON: Submerged arc welding of stainless steel is news when it is high-speed welding of *short-link chain* made from 1½-inch diameter Type 316 stainless round bars. That's the job done by Linde Company's Unionmelt submerged arc equipment on these preformed chain links at Pacific Chain Mfg. Company.

The high current of submerged arc welding—1200 amps, 60 volts, AC—is required to join the thick stainless. The operation is done with a composition flux (Unionmelt No. 80) and ⅜-inch diameter Type 316 stainless wire.

As the preformed chain moves along an assembly line, each link is enclosed in a split copper mold. After welding (left), the chain is moved to a second position where the completed welds are ground smooth (right).

Total time per weld is 22 seconds.

In Head and Eye Protection

486A GOGGLE. Flexible mask is very comfortable vinylite. Lightweight. A "2-in-1" goggle — can be worn by welders who wear Safety R$_x$ or personal glasses, and those who do not.

301A GOGGLE. This chipper's goggle, with new dome-type side shields, provides up to 15% more ventilation than the old flat side shields. Eyecups fit facial contour closely, eliminate any opening for particles to enter.

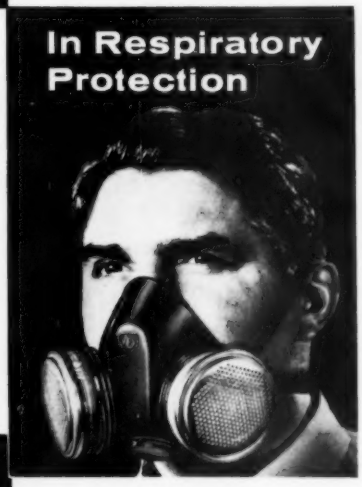
9706 HELMET. Revolutionary radio dial adjustment at rear. Easily adjusts to head size, eliminates slippage. Fiber glass shell resists moisture. No warping or cracking. Lift front insulated aluminum glass holder. A very popular helmet, as is companion Model 9702 without lift front.

In Body and Hand Protection

208 BCL CAPE SLEEVE AND BIB. Here's comfort in lightweight flexible leather for welders working on gas shielded electric welding where Argon, Helium and similar gases are used. Protects arms, chest, shoulders. Double stitched seams. Seam ends steel rivet reinforced. Snap fasteners attach bib. Armpit anchor buttons keep cape from unbuttoning. 5 sizes.

SC 5X163 GLOVE. Preferred for its exceptional resistance to heat on gas and heaviest amperage electric welding. Specially chrome-tanned split cowhide leather. One-piece back and palm. Welted at all vulnerable seams. Extra heavy lining on back of hand. 14" long.

In Respiratory Protection



R5056 RESPIRATOR. Offers Bureau of Mines Approved protection against metal fumes in welding, burning and cutting. New "miracle" filters provide highest efficiency and long service life.

Whatever the Protection Required...AO has a Performance-Proved Product for the Job!

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Your nearest AO Safety Products Representative can supply you.

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Failure of any part of a missile—be it the mighty Atlas, Jupiter or Thor—can mean failure of the mission. That's why the complex connections in the ducting systems of these and other missiles are silver brazed. These connections must stand up under 6,000 psi; they are tested to 12,000 psi.

In lines made to specifications by Flexonics Corporation, Maywood, Illinois, silver brazing joins a corrugated flexible pressure carrier, a braid sleeve and a coupling nipple—all of stainless steel; it permits joining all of these elements of the assembly without danger of annealing the pressure-carrying flex or the restraining braid as welding might do.

Assemblies designed for 6,000 psi operating pressure are required to withstand a 12,000 psi test and take four times their normal operating pressure before failure. They may also be required to pass a flame test in order to meet specifications.

The silver-brazed connections are used on hydraulic and pneumatic systems, fuel drain lines and vent tubes. Some of these applications involve rigorous service with extreme pressure shocks accompanied by sudden elevations of temperature, which may go from −60° to 400-600° F in a matter of seconds.

A more "high level" endorsement of Handy & Harman silver alloy brazing is not available. On the ground or in the air, the qualities of this remarkable metal joining method apply; strength, ease of production, cost, gas and liquid joint tightness to name a few. The entire brazing story is yours merely for the asking. Inquiries and metals-joining "problem exposure" may be addressed to Handy & Harman, 82 Fulton Street, New York 38, N. Y. We welcome the opportunity to work with you.

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No Margin Here for joint failure!

Assemblies in ATLAS Missile **HANDY & HARMAN** Silver Brazed

Intercontinental Atlas missile being made ready for launching.

Close-ups of missile section, showing silver alloy brazed ducting assembly.

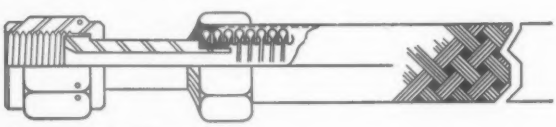

Diagram of pressure carrier.

FOR A GOOD START: BULLETIN 20.

This informative booklet gives a good picture of silver brazing and its benefits...includes details on alloys, heating methods, joint design and production techniques. Write for your copy.

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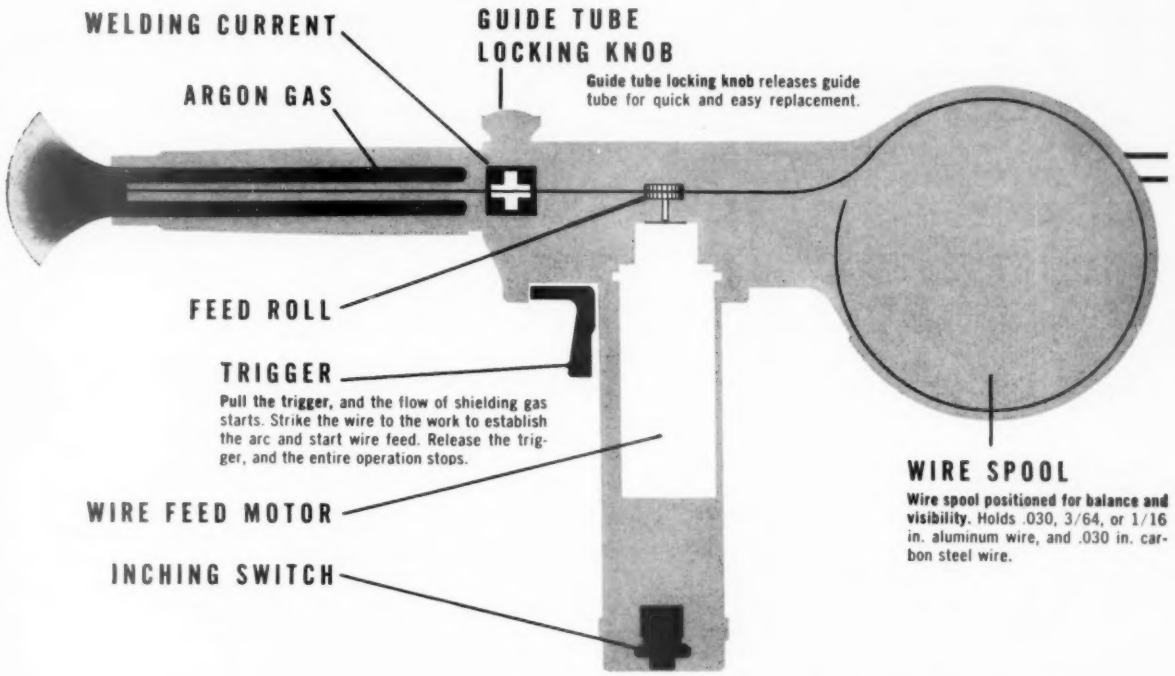
Try LINDE'S New "SIGMETTE" Torch!
–PORTABLE, COMPACT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GUIDE TUBE LOCKING KNOB
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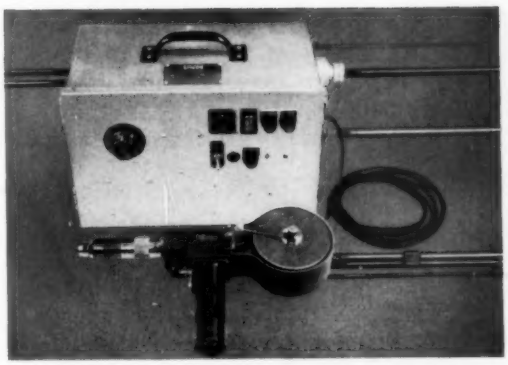
Guide tube locking knob releases guide tube for quick and easy replacement.
FEED ROLL
TRIGGER
Pull the trigger, and the flow of shielding gas starts. Strike the wire to the work to establish the arc and start wire feed. Release the trigger, and the entire operation stops.
WIRE FEED MOTOR
INCHING SWITCH
WIRE SPOOL
Wire spool positioned for balance and visibility. Holds .030, 3/64, or 1/16 in. aluminum wire, and .030 in. carbon steel wire.

Here's the torch that goes to the job—lets you work in any position . . . in confined spaces . . . at distance remote from the power source!

Designed for Sigma welding of light metals, the "Sigmette" torch is compact and sturdy. Notice the thin silhouette and position of the spool for complete visibility. Torch and control are completely insulated and grounded—the operator is protected from electrically "hot" parts. And the only maintenance tool needed is a screwdriver!

Find out how Linde's new "Sigmette" torch can speed your operations, bring new economies through its advanced design features. For a free demonstration and detailed information, mail the coupon today or call the nearest Linde Office.



Complete unit – torch weighs 3 pounds, 1 oz.; control weighs 19 pounds, 2 oz.; Current rating, 125 to 200 amp.; Welding power, direct current reverse polarity

Dept. IW-6, Linde Company
Division of Union Carbide Corporation
30 East 42nd Street, New York 17, N. Y.

☐ Please send complete facts on the new "Sigmette" torch.
☐ Please arrange to let me try it.

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WELDING MANAGEMENT

watches these developments

DISTRIBUTOR SALESMEN who work for the K-G Equipment Co. are going to school again, but this time it's the easy way—right in their own living rooms. The course is brief: less than 15 minutes. And the teacher? A phonograph record, made specially for a new campaign boosting the company's compressed gas pressure regulator line by Karl H. Schmuldt, vice president of the Allentown, Pa., firm which manufactures gas, welding, cutting and regulating equipment.

The "Regulator Roundup" program is intended to broaden the distributor salesman's knowledge of K-G's full line of regulators. It discusses regulator features and gives a step-by-step description of the disassembly and reassembly of a regulator while the salesman practices on a stock K-G regulator.

CORROSION TEST RESULTS AVAILABLE *from the American Welding Society cover 4300 specimens of metallized coatings exposed for three years at eight different test sites. An illustrated reprint of the complete report giving test sites, test results, atmospheric exposure and a comparison of aluminum- and zinc-sprayed panels is available from the A.W.S. at Department T, 33 West 39th St., New York 18, New York. Price is $.50.*

"IN THE FAST MOVING development of new welding methods, the same flexibility in submerged arc welding of alloy steels as there is in manual welding is the predictable goal of our industry," says James E. Norcross, executive vice president, Arcos Corporation, Philadelphia, Pennsylvania. "This includes both low alloy-high tensile and stainless steel joining and the overlaying of low alloy-high tensile steels.

"Successful overlaying or cladding of mild or low alloy steels with stainless by submerged arc is one of the most promising economical methods of providing corrosion and contamination resistant materials in the critical areas of nuclear reactors. Another important automatic welding development is internally fluxed wire for CO^2 shielded visible arc welding of mild and low alloy steel. There is a real potential for depositing high alloy metal in time.

"Each new process requires intelligent application. Some manufacturers demand fully automatic welding when manual is the logical choice. Each process should be evaluated with the application and volume in mind."

THE SECRETARY OF COMMERCE SAYS . . . *"As the second quarter begins, latest statistics of the Department of Commerce covering the first three months make it apparent that business is good; in fact, much better than was anticipated at the start of the year. The signs indicate that the current Spring vigor in the economy should increase in the coming months."*

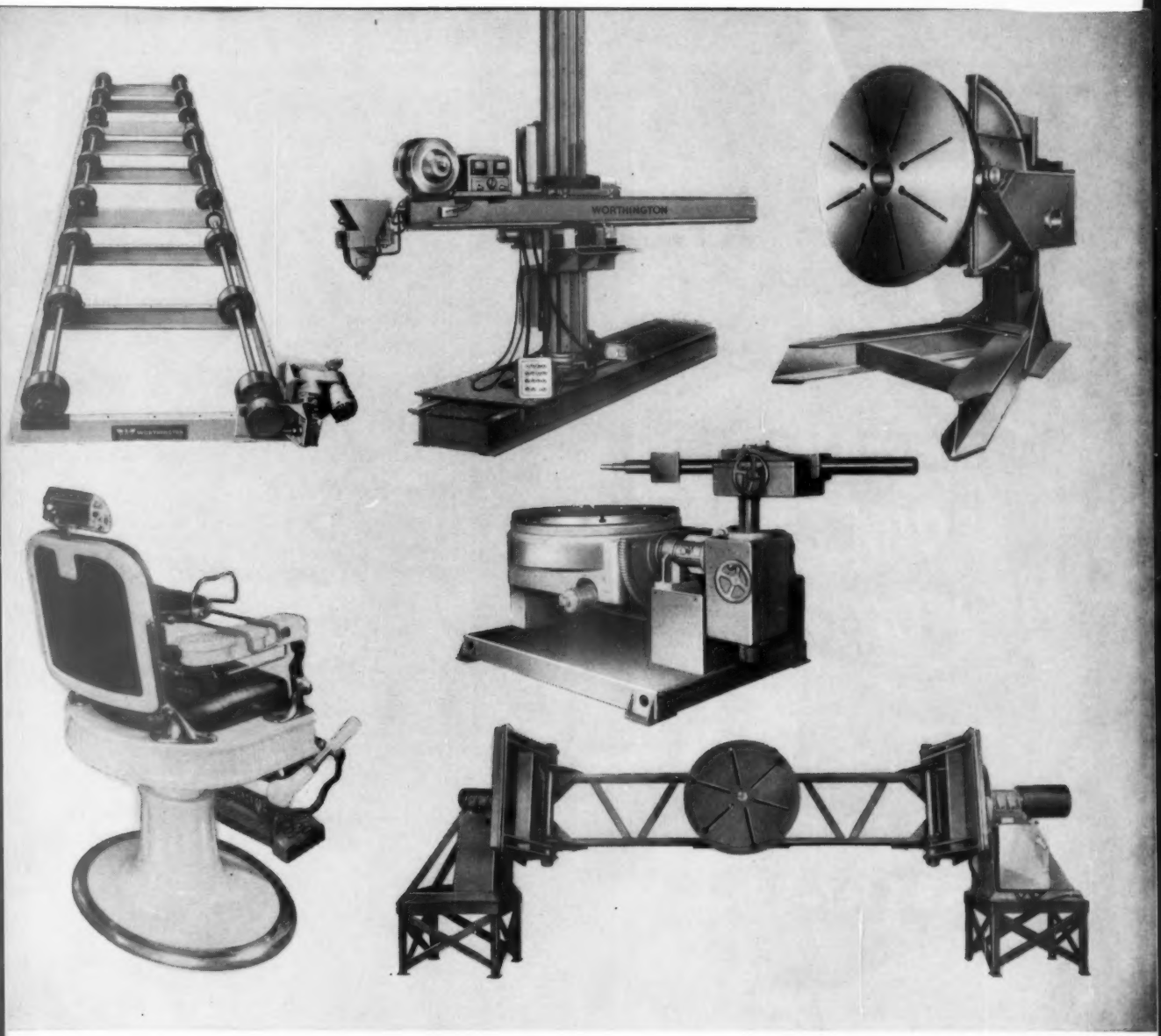
STANDARDS FOR TANKS ARE WANTED by the chemical industry. It is estimated that $5,200,000 could be saved annually if standardized storage and processing tanks could be purchased for atmospheric pressure service rather than buying "specials" for every need. As a result of a study made by the mechanical technical committee of the Manufacturing Chemists' Association and with the recommendations of the Chemical Industry Advisory Board, the American Standards Association has been asked to initiate a standardization project for shop-fabricated vertical and horizontal metallic storage and processing tanks.

THE WESTWARD MARCH *of the steel industry continues. The American Iron & Steel Institute reports the geographic center of steelmaking capacity in the United States has moved about 20 miles to the west during the past two years, and is now close to the Ohio-Indiana border. It is now near Spencerville, in Allen County, Ohio. When last computed in 1957 it was at Westminster, Ohio, in the same county.*

RESISTANCE WELDING SHIPMENTS continue their upward trend. According to the statistics compiled by the Resistance Welding Manufacturers' Association, March shipments were 15 percent ahead of February shipments; first quarter shipments in 1959 were 17 percent ahead of the same period last year. New orders received during March were 14 percent ahead of February and have increased 31 percent for the first quarter of 1959, compared to the similar quarter in 1958.

Members reported backlogs of more than $8¼ million at the end of March. This is a gain of more than $2 million in the last three months.

For More Information Circle No. 84 on Reader Service Card.→



WHICH ONE OF THESE POSITIONERS DOESN'T WORTHINGTON MAKE?

Of course, Worthington doesn't make barber chairs. We really don't know anything about cutting hair . . . *but,* when it comes to positioning for welding, that's where we're right at home.

Whether you're talking about a small positioner for automatic welding of a sub-assembly, a 400-ton turning roll for a nuclear reactor, or a completely integrated push button package, Worthington is ready and able to serve you.

You owe it to yourself to investigate the profit-producing possibilities of positioning equipment—especially in these days of steadily rising labor costs and tight work scheduling. You get faster production, better and smoother welds, fewer accident hazards and less need for crane service. Every piece of Worthington positioning equipment is job-rated for extra capacity, easy installation, greater parts interchangeability and economical operation. And you can count on equally complete Worthington engineering service . . . before you buy, during installation, right through regular maintenance. Why not ask your nearest Worthington distributor or District Sales Office for more information on profitable positioning equipment. Worthington Corporation, Section 55-7, Plainfield, N. J. In Canada, Worthington (Canada) Ltd., Brantford, Ontario.

WORTHINGTON . . . FIRST IN POSITIONING FOR WELDING

WORTHINGTON

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WELDING...

Another field where Modern Engineers take advantage of Belden Engineered Cable

ASK YOUR WELDING SUPPLY DISTRIBUTOR

Belden
WIREMAKER FOR INDUSTRY
SINCE 1902
CHICAGO

8-W

Magnet Wire • Lead Wire • Power Supply Cords, Cord Sets and Portable Cord • Aircraft Wires
Welding Cable • Electrical Household Cords • Electronic Wires • Automotive Wire and Cable

For More Information Circle No. 20 on Reader Service Card.

the profit-producing possibilities of po-

maintenance. Why not ask your nearest

WORTHINGTON

ALL THIS

100% DUTY CYCLE

225 Amperes Rated Output

5 KW 115/230v AC

1 KW 115v DC

12.9 HP ONAN ENGINE

AND NOW

ELECTRIC STARTER

The world-wide respect and demand for this original Miller gas engine driven welder/power plant has never been greater. To this established popularity has now been added the convenience of Bendix drive electric starting as optional equipment on models AEA-200-L and AEA-200. Model illustrated and headlined is AEA-200-LE.

As a welder, as a power plant, as a pipe thawer, indeed, as a top hand from Canadian uranium mines to Brazilian cattle ranches — and on highway construction jobs and repair ships between — the AEA-200-L stands quite alone as "the finest in the field." In addition to optional electric starter, road trailers and rubber tired running gear are also available.

Other Miller gas engine driven DC and AC-DC welder/power plants to 300 amperes at 100% duty cycle. Full particulars will be sent promptly upon request, or a demonstration can be arranged at your convenience.

miller Electric Manufacturing Company, Inc., APPLETON, WISCONSIN

EXPORT OFFICE: 250 West 57th St., New York 19, N.Y. • Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

For More Information Circle No. 56 on Reader Service Card.

15,000 people saw a record 125 exhibits at the A.W.S. Welding Show.

Exhibits, technical papers and awards program highlight American Welding Society's 40th Annual Convention and Welding Show

CHICAGO, ILLINOIS: "Welding has become the pivot—the key to the development of new alloys to meet the demands of aircraft, missiles and space travels."

With those words American Welding Society President Gustav O. Hoglund keynoted the AWS 40th Annual Meeting and Welding Show held here early in April.

Close to 15,000 persons interested in welding attended. They heard some 60 experts present technical papers on the latest developments in welding equipment, processes and techniques. And, they saw the largest display of welding equipment ever assembled. More than 125 manufacturers exhibited in this display at the International Amphitheatre. *(see page 62 for a review of new products introduced at the show.)*

Again highlighting the AWS Annual Meeting was an extensive awards program which saw 23 individuals honored by 10 national and 13 regional awards.

Dr. Ernest F. Nippes, professor of Metallurgical Engineering and director of Welding Research, Rensselaer Polytechnic Institute, Troy, N. Y., won the Samuel Wylie Miller Memorial Award for his outstanding contributions toward the advancement of the art of welding and cutting.

Adams Lecturer for the year was C. E. Jackson, Staff Engineer, Linde Development Laboratory, Newark, N. J., who was presented with a certificate and honorarium upon the presentation of his paper, "The Science of Arc Welding."

Honorary membership in the Society was conferred upon Mr. James F. Lincoln, Chairman of the Board of the Lincoln Electric Company. The award was made in recognition of his exceptional accomplishments in the development of the welding art.

The 1958 Lincoln Gold Medalist is Mr. Alexander Lesnewich of the Air Reduction Research Laboratory. This award is granted to the individual whose published paper in THE WELDING JOURNAL was judged to be the best of the year. The paper was entitled, "Control of Melting

RECEIVING AWARD from Worthington's Paul Galton (left) are E. T. Scott, Jr., and Ray Tarbell, Scott-Tarbell, Inc.

ANOTHER AWARD goes to Bob Kohlbry, Machinery & Welder Corp. (left). Paul Galton (right) makes the presentation.

Worthington Corporation Honors Two Distributors

CHICAGO, ILLINOIS: Two welding supply distributors were honored by the Worthington Corporation at a banquet held here during the American Welding Society's annual convention.

Honored for 15 years of loyal and devoted service were Machinery & Welder Corp., Chicago, and Scott-Tarbell, Inc., Cleveland, Ohio. Receiving the awards for their respective companies were Bob Kohlbry and E. T. Scott, Jr., and Ray Tarbell.

Presenting the awards was Paul Galton, sales manager for Worthington's positioning and automatic welding equipment.

Rate and Metal Transfer in Gas-Shielded Metal-Arc Welding."

The National Meritorious Service Award went to Harry W. Pierce, Vice Chairman of the Board of the New York Shipbuilding Company.

John Mikulak, Worthington Corporation; K. H. Koopman, Pressure Vessel Research Committee of the Welding Research Council, and L. V. LaRou, Wall Colmonoy Company, were awarded A. F. Davis Silver Medals. These awards are presented annually to the authors of the papers selected by the AWS Committee on Awards as contributing most to the progress of welding in the field of structural design and machine design.

The Past President Certificate was awarded to G. O. Hoglund whose term of office expired May 31, 1959. Mr. Hoglund is

Hoglund

MacGuffie

head of the Welding Section of the Alcoa Process Development Laboratory.

He is succeeded by Charles I. MacGuffie, manager of Special Products Department, Air Reduction Sales Co.

Other officers elected included: R. D. Thomas, Jr., Arcos Corporation, first vice president, and A. F. Chouinard, National Cylinder Gas Co., vice president.

District directors named were Harold Schultz, East Central; George W. Kirkley, New England; C. B. Robinson, Northwest; Joseph W. Kehoe, North Central; Clifford L. Moss III, Southwest; and Lester L. Baugh, West Central.

New directors-at-large include Jay Bland, General Electric Co.; Frank Singleton, Singleton Welding Supply Co.; Charles B. Smith, Douglas Aircraft Co. and J. R. Stitt, R. C. Mahon Co.

more news on the next page

ATLAS | WIDE-BLADE TOMAHAWKS

WORLDS LEADING WELD CLEANING TOOLS

for the welder who thinks he has everything!

NEW! "SUPER" TOMAHAWK

Get these SUPER features in new SUPER!

1. Redistribution of weight—The weight's in the head for more production with less effort.

2. New light weight, tempered aircraft aluminum shaft. Unbendable — unbreakable. Can't turn or come loose.

3. New Atlas "wide-blade" design. Wider chipping edge further increases chipping speed—adds to life of tool.

4. Formed hardwood grip that fits the hand. Locked on shaft so it can't turn or loosen.

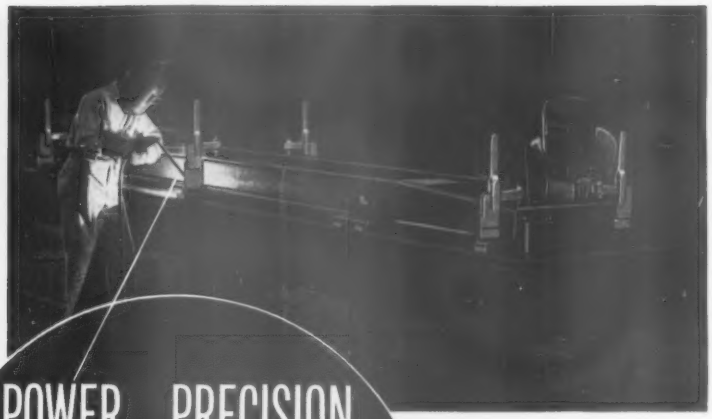
Tough as they come!

33 MODELS

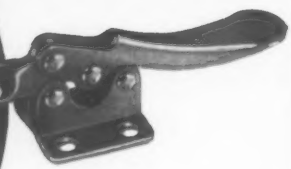
Each Atlas tool is made as well as we know how. Ask your welding supply dealer to show you the complete line.

ATLAS WELDING ACCESSORIES INCORPORATED
707 E. LEWISTON
FERNDALE 20, MICH.

For More Information Circle No. 16 on Reader Service Card.



POWER...PRECISION
SPECIFY
DE-STA-CO
TOGGLE CLAMPS
FOR QUALITY, TOO!



De-Sta-Co "Tiny Toggles" are ¾" high, 2¾" long when closed. Many different bases. U and solid work-holding bars. Ideal for light gauge welded assemblies where space is at a premium.

International Conveyor built this fixture to produce over a hundred 18' wheeled conveyor fixtures on which automobile frames are assembled. The 7" H-beams are brought to bear properly during welding, even sprung to fit, by six De-Sta-Co Model 558 Clamps developing over 2500 lbs. pressure. The completed conveyor line assembly fixtures also employ De-Sta-Co Toggle Clamps.

If your holding problems are at the opposite extreme, there's a group of "Tiny Toggles" only ¾" high but packing 42 lbs. of pressure. This is just an indication of the range you'll find in the De-Sta-Co line of over 130 models, types and sizes for every conceivable fast-action parts holding job. Welders predominantly specify our portable plier clamps. A broad selection of spindle accessories makes it easy to fit any clamp to your job. Along with this versatility, notice the quality features, such as plastic grips, cadmium plating, hardened bushings and serrated pivot pins, as you might expect of the originators of production speed-clamping devices.

Send for new catalog showing many clamp applications, dimension drawings and mechanical data. Ask for the name of the De-Sta-Co stocking distributor in your area.

Portable Clamps

Angular-Bar Type

Air-Operated Type

De-Sta-Co is widely known for toggle clamps, stampings, precision washers, spacers, shims, shim and feeler stock, blower housings and marine specialties.

DE-STA-CO
Originators of Production Clamping

DETROIT STAMPING COMPANY
324 MIDLAND AVENUE • DETROIT 3, MICHIGAN

For More Information Circle No. 25 on Reader Service Card.

Automatic Welding Machinery Makers Form Association

CLEVELAND, OHIO: The promotion of greater and wider uses for automatic welding machinery is the objective of the recently formed Automatic Welding Machinery Association.

Hollis

Gunzelman

First president of the Association is E. W. Hollis, general sales manager of the Lewis Welding & Engineering Corp., Bedford, Ohio. Elected vice president was Willard Gunzelman, general manager, World Electric Company, Cleveland.

Named to the executive committee, in addition to Hollis and Gunzelman, were Paul Galton, Worthington Corp., Plainfield, N.J.; John Berryman, Air Reduction's Special Products Division, Union, N.J.; John Berkeley, Berkeley- Davis, Inc., Danville, Ill.; E. J. St. Eve, Pandjiris Weldment Co., St. Louis, and J. H. Cooper, Taylor-Winfield Corp., Warren, Ohio.

Formation of the new Association climaxed a series of meetings held during the past year. Representatives of 23 automatic welding machinery manufacturing companies attended these meetings.

The formal organizational meeting was held in Chicago during the American Welding Society's annual convention and welding show.

Association headquarters are in The 1010 Euclid Building, Cleveland.

more news on page 64

For 27 Years Preferred By Welders

THE DURO "STANDARD"

- All Parts quickly replaced with a screwdriver
- Screw-in type jaws — No tools required
- Insulated Handle and Guard — Protects operator
- Rugged Fibre Handle — Lasts longer
- Cool Operation — Cool Handling

Featuring "Long Jaw design" for reaching those "hard to get at places".

The New Duro "DUROGON" Tong-Type

THE DUROGON-N3 and N3HD

- All Parts quickly replaced with a screwdriver
- Fully Insulated — Greater safety
- Cool Operation — Cool Handling
- With ALUMINUM Body — Less operator fatigue
  Mechanical Cable Connection
- With BRONZE Body — For heavy duty operation
  Mechanical, soldered or brazed connection

"The BEST of this Popular Design!"

DURO

ENGINEERING COMPANY · 31 OREGON AVE. · VIEW, CONN.

For More Information Circle No. 26 on Reader Service Card.

New Bausch & Lomb Line of

WELDERS' CUP-TYPE GOGGLES

Get a greater degree of eye protection, *plus* economy, *plus* worker acceptance. Injection molded from tough thermoplastic in a cool green color, these new, improved goggles resist high impact, are super comfortable, good-looking and easy to keep clean. Famous B&L Arc-Ban lenses in shades 3 through 12 provide safe, scientific protection against injurious radiations.

S-94 CUP-TYPE Basic Bausch & Lomb welders' goggle with the new two-piece louver side shield that excludes light, lets in air. Bead chain bridge adjustment.

S-84 COVERALL Contoured to fit comfortably against face and over all sizes of regular prescription eyewear. Soft leather nose pad with slide adjustment.

S-85 COVERALL with BRACE BAR Brace bar holds both cups together, so goggles may be slipped up, adjusted, or removed with one hand. The bridge may be widened or narrowed by straightening or deepening curved section of brace bar with pliers.

S-84P COVERALL WITH FACE PAD Only Bausch & Lomb has this coverall welders' goggle with the comfort-fitting, removable face pad. Made of soft sponge rubber in a neutral flesh color, it snaps into place easily and it can be removed for cleaning or replacement. Pads may be purchased separately.

BAUSCH & LOMB
SINCE B&L 1853

Bausch & Lomb Optical Co.
91042 Smith Street,
Rochester 2, N. Y.

For More Information Circle No. 18 on Reader Service Card.

Men On The Move

Lowell

Gates

APPOINTMENTS:

Henry T. Lowell, Jr., has been named sales manager for *Sperry Products, Inc.*, Danbury, Conn. He will direct all sales activity for the company's railroad services, ultrasonics and other manufactured products.

H. V. "Vern" Gates has been appointed to head the newly formed *Fibre-Metal Pacific Company, Inc.*, Bell Gardens, Calif. The distributorship will warehouse and wholesale welding accessories and safety equipment made by Fibre-Metal Products, Co., Glendale Optical Co. and J. N. Ragle Industries, Inc., in seven Western states.

Walter H. Wooding, former civilian head of the Industrial Test Laboratory at the Philadelphia Navy Yard, will join the *Arcos Corporation*, Philadelphia. He will report to **Hallock Campbell,** director of the Arcos research and engineering department.

Albert J. Clark is a new district sales manager for *Miller Electric Mfg. Co.* His territory is the northern three-quarters of Alabama, parts of Mississippi and North Carolina and all of Tennessee.

The appointment of **Fred D. Brown** as marketing manager for *Westinghouse Electric Corporation's* arc welding department has been announced. He will be located at the welding department's main plant in Buffalo, N. Y., and will direct all marketing functions.

Fred A. Meunier has joined *Magnaflux Corporation*, Chicago, as senior engineer in the Electronic Engineering Department. He will be responsible for the development of magnetic and eddy current testing instruments for steel tubes and bars.

Anthony C. Del Vecchio has joined the industrial sales force of the *D. E. Makepeace Division of Engelhard, Industries, Inc.* He will sell in the Philadelphia area.

Three salesmen have been assigned to permanent territories by *Belden Mfg. Co.*, Chicago. They are **Howard Baron,** who will cover parts of Illinois and Wisconsin; **Dick Fritze** assigned to cover parts of Indiana, Kentucky and Tennessee and **John Barthelmy,** Florida and parts of Georgia and Alabama.

ELECTIONS:

L. L. McBurney, *Smith Welding Equipment Corp.*, Minneapolis, was elected president of the *International Acetylene Association* at that group's annual convention. **J. L. Adank,** *National Cylinder Gas Co.*, Chicago, was elected vice president; **R. A. Speck,** *National Carbide Co.*, New York City, was re-elected treasurer and **L. G. Matthews,** *Linde Company*, New York, was re-elected secretary.

The Board of Directors of the I.A.A. for 1959-1960 includes **P. F. Lavadan,** *Liquid Carbonic Corp.*; **C. E. Monlux,** *Linde Company*; **C. McL. Pitts,** *People's Gas Supply Co.*; **E. Easterly,** *Union Carbide Corp.*; **J. L. Adank; C. G. Andrew,** *Air Reduction Sales Co.*; **L. W. Hench,** *American Oxygen Service Corp.* and **H. S. Sutherland,** *Shawinigan Chemicals, Ltd.*

RETIREMENTS:

Richard W. Torbert has retired as Manager, Engineering Service, Railroads, of *Linde Company, Division of Union Carbide Corporation.*

continued on page 20

you do... with these NEW

SuperGrip®

GROUND CLAMPS

Model L—500 Amps.

Model M—300 Amps.

Model S—200 Amps.

Quick and "handy" grounding speeds up the welding job and a positive connection saves welding power to produce more welding work per day. These new *SuperGrip* GROUND CLAMPS were designed by the industry's most experienced manufacturer of welding and safety equipment.

check these outstanding features:

EXTENDED LOWER LIP for easy clamping with quick "under and on" motion.

BALL POINT SET SCREW of "man size" diameter grips cable tightly for full cross-section connection.

CABLE SUPPORT LIP offers added wrap area to minimize strand breakage.

POWERFUL COMPRESSION of spring gives maximum "bite"... with spring fully insulated from grips.

BROAD, FLAT BASE JAW and heavy teeth offer large contact area for positive connection.

ASK YOUR WELDING DISTRIBUTOR *or write for Bulletin No. T2-R*

The FIBRE-METAL Products Company | CHESTER PENNA.

In CANADA: Fibre-Metal (Canada) Limited, Toronto

For More Information Circle No. 33 on Reader Service Card.

ELECTRIC-ARC INC.

One of a Series on Applications of Electric Arc's Smith-Dolan Units — Today's Most Versatile Heat-Treating Tools.

STOP WELD FAILURE with the SMITH-DOLAN SYSTEM of Low-Frequency Induction Heating

Here is the versatile heat-treating tool you need for producing sound welds easily and economically in carbo-alloy and other types of steel pipe . . . here is precision control of heating cycle when pre-heating and stress relieving — uniform, through-and-through heating of solid sections up to two feet thick and more — pushbutton operation — complete portability for on-the-job heat treating anywhere.

Many Money-Saving Applications — The Smith-Dolan System simplifies and upgrades work quality in numerous applications ranging from welding to forming and annealing. Units are available for 60 cycle heating in capacities ranging from 10 to 150 KVA . . . for 400 cycle heating . . . resistance heating. Pre-engineered with complete instrumentation, accessories.

"On Trial" Installations on Rental Basis — Prove the many Smith-Dolan advantages in your own plant without capital investment. Write, wire or phone.

Electronic recording gives permanent charts of heat run on this standard Smith-Dolan model. Coils permit work at 50 feet or more from unit. Eye hooks provide for easy handling by crane. Products ranging from a fraction of an inch to 10 feet in diameter can be heat treated on the job.

New Brochure — Send today for your copy of "Smith-Dolan System of Low-Frequency Induction Heating."

Electric Arc, inc.

152-2 JELLIFF AVENUE, NEWARK 8, N. J. Bigelow 3-3211

Representatives in Principal Cities

For More Information Circle No. 29 on Reader Service Card.

MEN ON THE MOVE

continued

PROMOTIONS:

Edward W. Lothman has been elected senior vice-president and **Richard W. Nuffort** vice president and treasurer of *Whitehead Metals, Inc.*, an affiliate of *International Nickel Co., Inc.* At the same time, **Casimir J. Bianowicz** was appointed general sales manager for all products of Inco's *Huntington Alloy Products Division*, and was elected a director and assistant vice-president of Whitehead.

J. G. Bollinger has been appointed manager of production and distribution in addition to his present duties as assistant to the president of *Air Reduction Pacific Co.* He will maintain headquarters in San Francisco.

Belden Mfg. Company, Chicago, has made several changes in its sales organization: **Wayne Hernly** has been appointed district sales manager of a newly created Southeast Central District, consisting of Indiana, Ohio, Kentucky and parts of Illinois and Tennessee. **Gordon Shirreffs** has taken over a newly created territory covering parts of Illinois and Wisconsin. **Chuck Atwater** will concentrate on industrial accounts in parts of Indiana and Kentucky.

Four promotions have been announced by the *Norton Company*, Worcester, Mass. Named abrasive engineers in the company's field sales organization were **Richard B. Hardy,** Philadelphia, and **Stephen W. Anderson,** Minneapolis. Other promotions include **Gilbert R. Blake,** product safety engineer, and **Peter B. Marshall,** supervisor of sales training.

Appointment of **A. J. McDonald, Jr.,** as sales manager of *Welders' Supply Co.*, distributor subsidiary of *Chemetron Corp.*, has been announced by Chemetron's *National Cylinder Gas Division.* Welders' Supply has nine stores in the Southern California area.

slow repair services

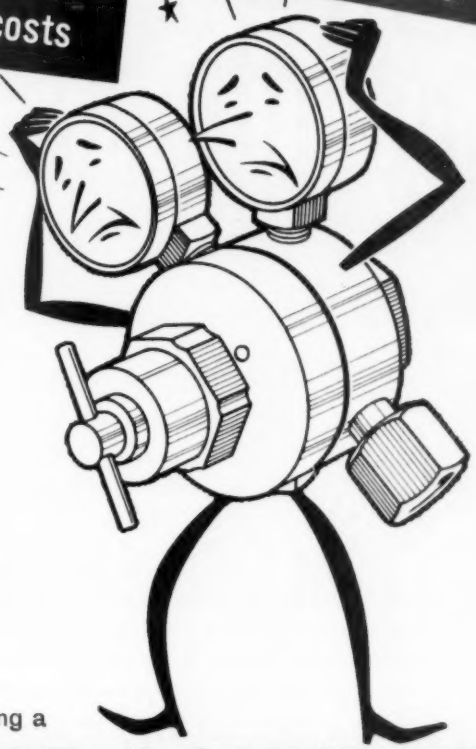
downtime due to regulator failure

frequent, costly repairs

high repair parts inventory

high replacement costs

poor pressure regulation



Having regulator headaches?

...END THEM NOW!

K-G distributors everywhere are having a

REGULATOR ROUNDUP

...to put the outstanding line of K-G regulators to work for you

We're trading high... and giving you an UNCONDITIONAL 2-YEAR GUARANTEE

Get all the dollar-saving facts... use the Reader Service Card

MAIL COUPON

K-G Equipment Co., P. O. Box 512, Allentown, Pa.
Please send me the name & address of my K-G Distributor.

Name.....

Company.....

Address.....

Now's the time!

to standardize on the K-G equipment company, inc.

an Air Products subsidiary Allentown, Pa.

quality welding and cutting equipment since 1914

For More Information Circle No. 48 on Reader Service Card.

New-
PAGE Coil Identification!

Liner Markings End Mix-Ups—Save You Money!

• Here is a new, exclusive PAGE development which will benefit you. Each coil of PAGE automatic welding wire now has the grade stamped on the inside of the liner, insuring positive, instant identification. And—on #2 coils, in addition to the stamped grade number, liners are color-coded; the color of the stripe on the liner indicates the grade, making identification double-quick and foolproof.

What does this mean to you? No more scrapping of partly-used coils because tags have been lost. No more danger of using the wrong analysis when coils are mixed in storage. Positive identification ends waste and confusion.

This means real savings to you—and these new PAGE features are yours at no increase in price.

Let PAGE Help Solve Your Welding Problems

These Folders can help you

Write for:

Folder DH-402-0
Contains information on submerged arc and inert gas automatic welding wire. Lists descriptions and uses of the many PAGE analyses. Describes our extensive variety of packaging. Illustrated.

Folder DH-1218 • Chart lists detailed analyses of PAGE automatic welding wires, metal spray wires, bare electrodes and gas welding rods. Shows uses and physical properties. Lists most competitive makes.

Positive identification is just one of the advantages that PAGE has to offer. When you bring your welding problems to PAGE, you get the benefit of over half a century of wire-drawing experience and leadership in metallurgical research. Leadership evidenced by the industry's widest range of analyses—33 grades designed to do an endless variety of welding jobs. Let PAGE help you improve your quality and lower your costs by furnishing the right wire for your job.

PAGE wire packaging is designed to give you the utmost in convenient storage and handling, whether you require a 1# spool or a 1200# payoffpallet. Prompt delivery is assured from a coast-to-coast network of PAGE distributors backed up by strategically located PAGE warehouses.

You will find it is "good business" to bring your problems to PAGE.

ACCO

PAGE WELDING WIRE

Page Steel and Wire Division • American Chain & Cable Company, Inc.

Monessen, Pa.*, Atlanta, Chicago*, Denver*, Detroit, Houston*, Los Angeles*, New York, Philadelphia*, Portland, Ore., San Francisco*, Bridgeport, Conn.

*Indicates PAGE warehouse stocks

PAGE—THE SOURCE FOR ANSWERS TO WELDING PROBLEMS

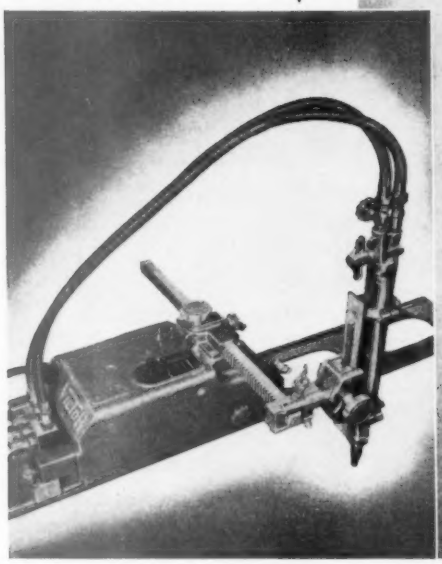
For More Information Circle No. 59 on Reader Service Card.

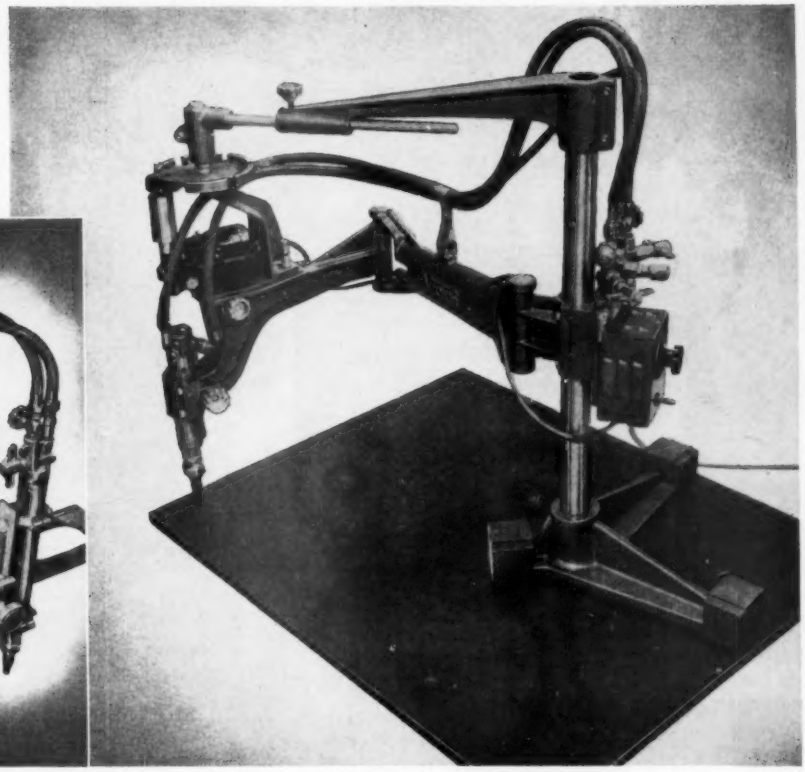
SPEED YOUR PRODUCTION

with these Victor Cost-Cutters

DUPLICUTTER MODEL DC-2000
For cutting shapes →

FLAME CUTTER VU-120
For straight and circle cutting ↓





Victor Flame Cutter, Model VU-120

- Cuts straight lines, square or bevel kerfs, circles to 96" diameter.
- Adaptable to submerged or inert arc automatic welding.
- Travels 0 to 180" per minute forward or reverse; variable speed transmission provides full power over entire range.
- Free-wheeling neutral for easy positioning.
- Accommodates both 2 and 3-hose torches, with or without gear rack.
- Second torch holder available for parallel cutting.

Victor Duplicutter, Model DC-2000

- Duplicates shapes up to 19½" diameter circles, 12" x 35" rectangles.
- Holds tolerances of plus or minus 1/64" in 2" steel.
- Templates easily changed, making practical both long runs or a single copy.
- Weight, 36 lbs. — easily carried.
- Magnetized feet set on stock being cut — no levelling needed.
- Uses Victor cutting tips thru size 5.

To see how Victor Cutting Machines can speed your production, ask your Victor dealer for a demonstration . . . or write us for descriptive Bulletin 353.

Profitable dealerships open in a few areas; inquire now.

VICTOR® for cutting

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; high pressure and large volume gas regulators; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

56

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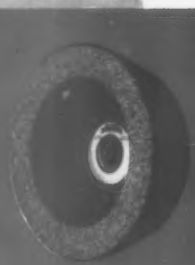

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LIBRARY

of welding

ARC WELDING MANUAL

LaMotte Grover for Arc Welding Section of National Electrical Manufacturers Association, 155 East 44th Street, New York 17, New York; 46-pages; $.25.

The Arc Welding Section of the National Electrical Manufacturers Association has published a new welding manual designed for schools, colleges, and apprenticeship training courses. Prepared by La Motte Grover, it is intended for use as a supplementary text in an elementary course on strength of materials.

Divided into two parts, the manual, "Arc Welded Joints—Strength of Joints—The Processes," is available through NEMA and the American Welding Society at a cost of $.25 per copy.

Part I gives the student a grasp of the methods for applying the principles of mechanics of material to the proportioning of simple arc welded joints and connection, to conform to requirements for nominal working stresses.

Part II is provided mainly for general interest and reference. It includes a list of standard definitions of most frequently used welding terms. A short description of American Welding Society arc welding symbols is given.

COBALT (Issue 2)

Cobalt Information Center, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio; 59 pages.

The second issue of the Cobalt Information Center's quarterly, *Cobalt*, is now available.

Featured is a technical paper on newly developed cobalt-chromium-iron-base alloys with interesting oxidation, corrosion and wear-resistant properties. Applications for these alloys in the mining, extractive-metallurgy, heat-treating and gypsum industries are listed.

A paper on "Cobalt in Steels" discusses what improvements may be expected of carbon and alloyed steels with cobalt additions. "Alloys for the Aircraft Industry" reviews recent alloy developments, lists requirements for aircraft components and evaluates cobalt-containing alloys.

The 59-page issue is completed by 129 abstracts on cobalt from current literature.

Requests should be addressed on company letterhead. Persons outside this country should write to the Centre d'Information du Cobalt, 35, rue des Colonies, Brussels, Belgium

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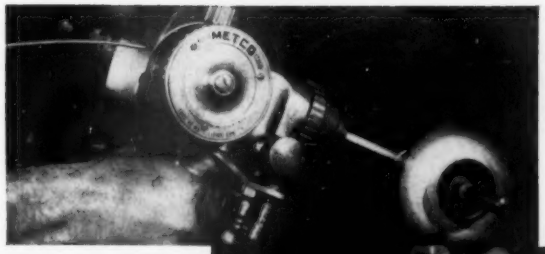

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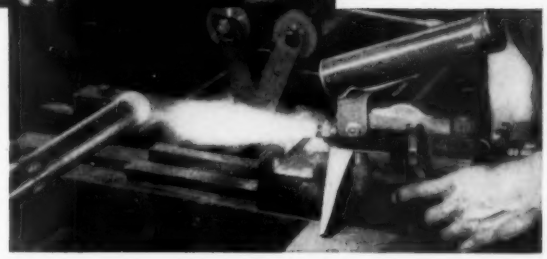

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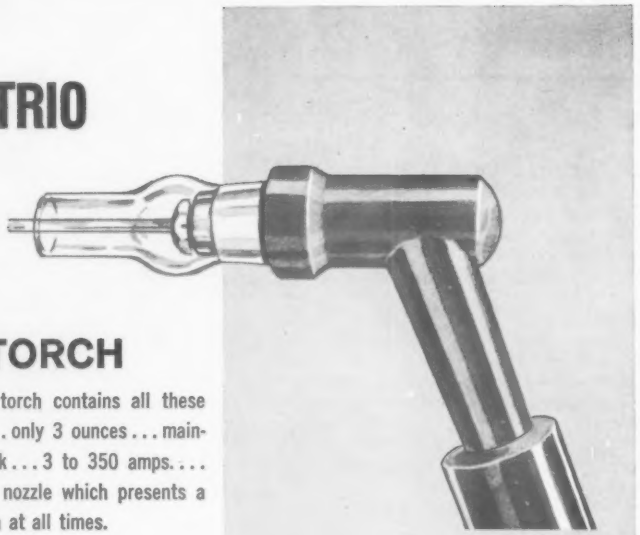
the TOP TIG welding TRIO



the torch

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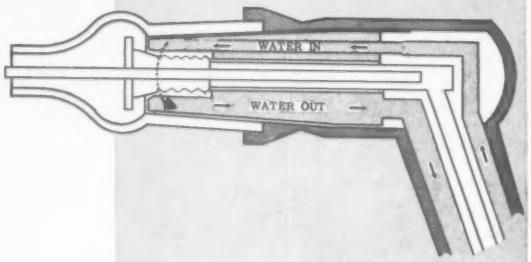
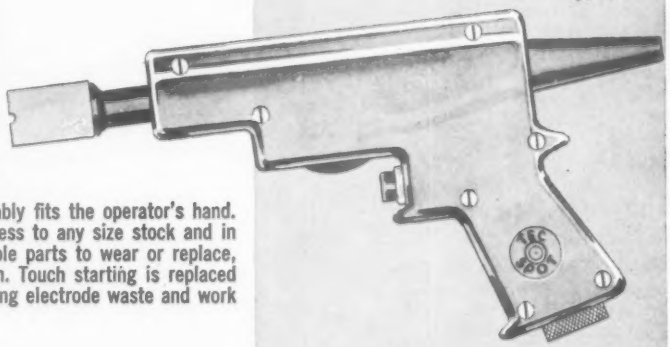


the gun

TEC SPOT GUN



This TIG spot welding tool perfectly bridges the gap between resistance welding and TIG arc welding. The TEC Spot Gun has been designed to increase production output and replace expensive spot welding operations. The lightest weight, most compact spot gun ever made, it comfortably fits the operator's hand. Weld up to, and including ⅛" thickness to any size stock and in any joint design. There are no movable parts to wear or replace, permitting maintenance free operation. Touch starting is replaced by high frequency arc starting, reducing electrode waste and work contamination.

the control

TEC SPOT CONTROL

This perfect welding mate for the TEC Spot Gun, converts any DC power source into a new TIG spot welding machine. A choice of preset welding times can be selected at the gun itself. The TEC spot control unit is light and compact, with easy to read controls. It is the only control unit of its kind. This portable TEC spot control unit can easily be connected to any DC power source.

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For More Information Circle No. 70 on Reader Service Card.

Soup's on

Boy! Did I get in hot water one night last week when Jack Higgins, an old welding buddy of mine, came to dinner at our house with his wife, Mildred.

Goldie made me promise on a stack of Inco Bulletins that I wouldn't talk shop with old Jack. And believe it or not, everything was going along real fine until Goldie put the soup on. Without thinking, I remarked that just the other day I saw how they made these giant 600-gallon stainless-jacketed Nickel soup kettles for the big soup companies.

You know, I could actually feel Goldie's eyes burning right through me. I looked up at her, and then I looked down into my soup like a little boy who was just scolded for saying a dirty word.

But old Jack missed the dirty look and took after the soup kettles like a bird dog after game. "Just how do they make them, Nick?" he asked.

"Well . . . ah . . . well," I stalled while I watched Goldie slowly turn as red as her tomato soup. "Oh, you wouldn't be interested in this dissimilar alloy welding job, Jack", I said, trying to put him off.

"Me? Me not interested in dissimilar alloy welding? You've been tipping too many beer glasses, Nick. Come on . . . how do they do it?"

I took a sip of soup . . . gulped hard . . . and whispered, "With Inco-Weld* 'A' Wire and Electrodes."

"What's with the hush-hush?" Jack asked.

"Bad throat" I whispered, pointing to my Adam's apple.

But even this little white lie didn't stop him. "Let's see . . ." he said out loud as he tried to figure out for himself how they did the job. "They must have used the Inco-Weld 'A' Electrodes to tack the inner Nickel shell to the stainless flanges . . . and then they must have TIG welded the seams with Inco-Weld 'A' Wire. Right, Nick?"

He couldn't have been righter. But I didn't dare say a word with the "warden" watching me like a hawk. I just nodded a yes.

He was going full steam now. Nothing could stop him. "I use Inco-Weld 'A' Wire and Electrodes for my dissimilar alloy combinations, too, Nick. I've used them to join 304 stainless to Monel* alloy and carbon steel . . . carbon steel to Monel and Inconel* alloys . . . Nickel to 304 stainless. I guess the welds on the kettles are just as sound, strong and corrosion-resisting as the welds I get. No finishing, either. Right, Nick?"

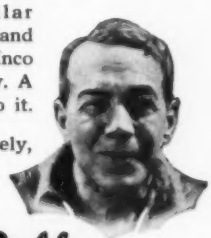
Again, he was righter than rain. But still I didn't dare say a word. So he turned to his wife Mildred hoping to get someone to answer him in English, not in sign language. "You know, honey, I bet I use Inco-Weld 'A' Wire and Electrodes to join about 97% of all the dissimilar alloys we use in our shop."

She answered him all right. Softly she said, "Can I use it to join your lips so you'll keep your big mouth shut?"

All was then quiet on the welding front.

But, guys, there's still plenty more you'll want to know about Inco-Weld 'A' Wire and Electrodes for your jobs. You can read it all in the Inco booklet "Now You Can Weld Dissimilar Alloys Quickly and Easily." Write Inco for your copy. A postcard will do it.

Sincerely,



Nick Rodder

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Economics In Designing And Manufacturing Of Welded Fabrication

PART TWO / In a series of three articles

Manufacturing: Processes,

IN BRIEF: Continuing his discussion of welded fabrication, the author covers design for welding. He explains process adaptation, economical use of materials, and effects of vibration and noise.

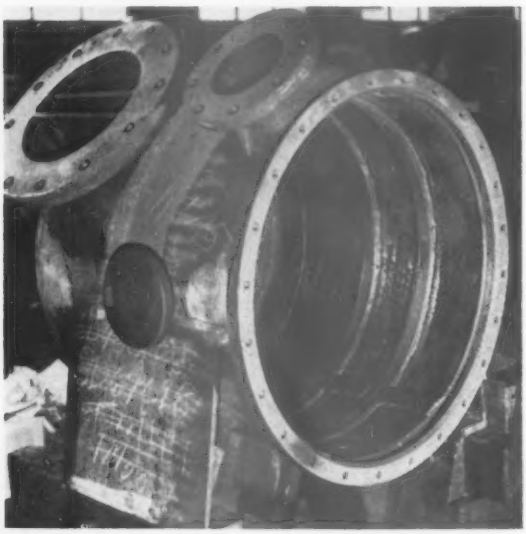


FIGURE 1: Two-stage centrifugal compressor case weldment is made of composite cast steel, pressure spun head, and plate design.

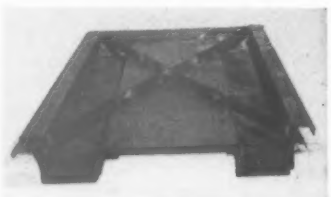


FIGURE 2: New bedplate design using $\frac{1}{16}$'' ga. sheet. Unit weighs 30 lbs., costs $8.40.

FIGURE 3: Old bedplate design using $\frac{3}{16}$'' steel plate. Unit weighs 32 lbs., costs $9.-25.

THE IMPORTANCE OF GOOD DESIGN in modern machinery cannot be overemphasized. Present day competition demands the required strength and performance at minimum cost. Good design is the first step in meeting these requirements.

PROCESS ADAPTATION

Welded structures are unique in that you can use many processes in producing components of a structure. You can make a flat plate most economically in the rolling mill. Something like a combustion head probably can be made more economically by casting. Between these extremes there are many other processes such as forging, pressing, bending, extruding, rolling (see Process Selection Chart on opposite page).

Foundries have troubles making complicated castings with many ribs and fillets. The finished castings are heavy and the rejection rate is high.

By using many processes, you may be able to build up the same structure from smaller simpler castings. Or you may be able to incorporate smaller castings with plate or members produced by other processes. You'll not only conserve material but you'll also lower shop costs.

Figure 1 shows a compressor case. Once it would have been cast in one piece, probably in cast iron. This one is economically built of a dished head, rolled rings, rolled plate, and cast steel nozzles. To make it at the lowest cost the builders used automatic submerged arc, semi-automatic submerged arc, Dual-shield process and manual electric arc welding. At first they torch-cut the rings from plate. Later they used rolled form ones. Now they roll bar stock and weld it either by automatic arc welding or by flash welding. That cuts the cost markedly.

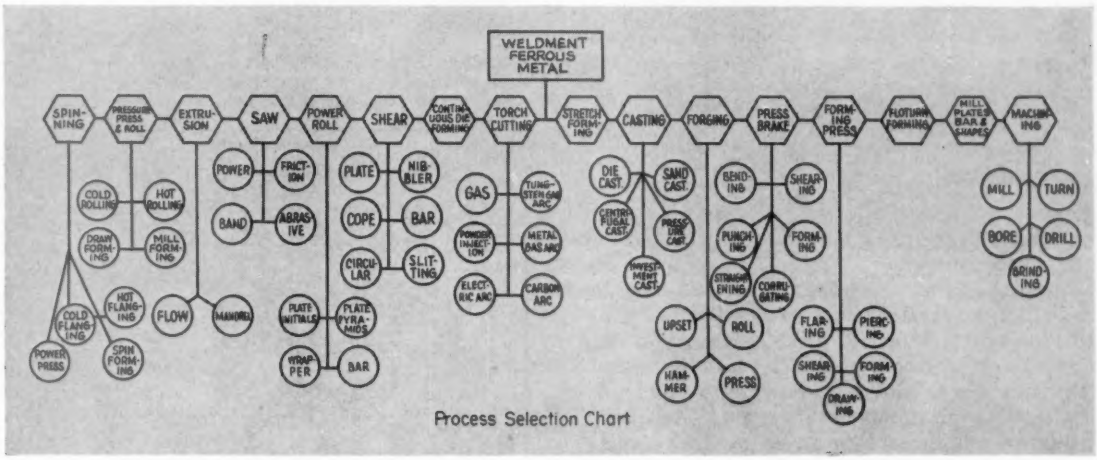
Welderies, just like other industries, fall into uneconomical ways of doing things. It's easy to torch cut plate, so they torch cut the rings. It is expensive, because it turns out a lot of scrap. Job rolling, and flash welding produces the same rings at high volume much more efficiently. For smaller quantities the rings can be manually, semi-automatically or automatically arc welded.

ECONOMICAL USE OF MATERIALS

The designer of welded products is learning

Material And Design

by **JOHN MIKULAK,** *Assistant to Vice President of Manufacturing, Worthington Corp.*



Process Selection Chart

a lot about lightweight design. The aircraft and missile industries are rapidly applying honeycomb structures. Material 0.002″ and 0.003″ thick are welded up to produce structures more rigid than material 1/16″ thick. Figure 2 shows the principle. It shows a plate made of 1/16″ thick material. It's stiffer than the one made of 3/16″ shown in Figure 3. It's all a matter of design, the proper shapes, placing materials correctly. You can see how important this is when you consider that material cost for heavy carbon steel members runs 60 to 70% of the shop cost. Welded structures of carbon steel requiring material cost over 45% of the total shop cost are very likely to be uneconomical.

By not automatically accepting traditional, or outmoded fabrication techniques you can contribute handsomely to cost reduction. Figure 4 illustrates a shell plate for compressor case of Figure 1. Normal production methods would roll the three members separately. They need not be. As shown here the three members were welded in the flat and then rolled as one sheet. Spacers are slipped on to the top roll to form the shell properly.

Light members can similarly be fabricated by corrugating and rolling, as shown in Figure 5. Parts made that way are usually stiffer, vibrate less, are quieter than parts made conventionally of heavier construction and stiffened with separate members.

VIBRATION AND NOISE

We still suffer from not knowing enough about controlling noise and vibration. We used to concede (incorrectly) that a heavy structure absorbed more vibration energy and made less noise, in addition, we also thought a heterogeneous structure of mix materials such as cast iron, was superior in both properties. Actually, noise and vibration depends on design. Figure 6, shows how vibration dampening is proportional to the applied stress intensity.

To get a good quiet design keep down the weight, control the stiffness, don't overdesign. Control noise by minimizing the number of possible nodes of vibration. You can avoid nodes in steel at high levels of stress by corrugating it or making it rigid. Punching hole patterns also helps. So do acoustical materials. Castings are limited to the hole punching and acoustical treatment, because of heavy walls and ribbing.

HOW TO DESIGN

First, consider the process to make the components. Then determine the functional requirement of each member. Sometimes you want to use a different manufacturing process

FIGURE 4: Improved technique welds bars to plate in flat and rolls items simultaneousy to decrease cost. Illustrated is shell plate of compressor case shown in Figure 1.

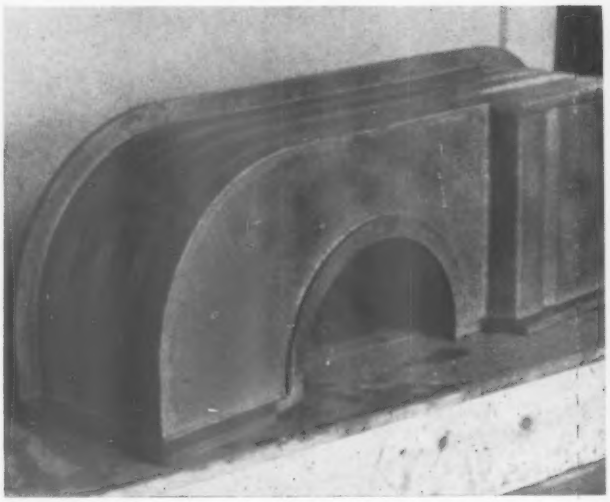


FIGURE 5: 11 gauge sheet steel housing replaced cast iron housing with ¾" walls. Corrugations made with flat sheet and rolled to shape give increased strength and stiffness.

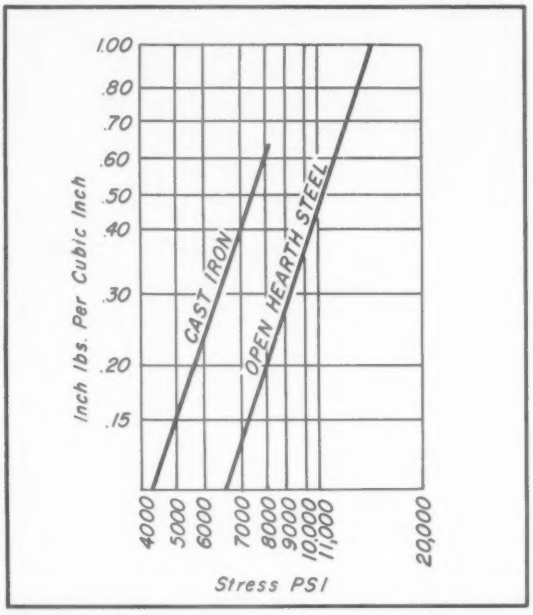


FIGURE 6: Vibration dampening is proportional to the applied stress intensity. Steel gets the nod over cast iron.

WELDED DESIGN *continued*

after you take a second look. Then you should consider in detail the condition under which the product must work.

The best and most economical structure is the one which needs the fewest welded joints. The structure should be designed so that you can reach the welded joints with the least handling. Sub-assembly production often helps cut costs. Try to select the sub-assemblies so you have only to control one dimension on each. This simplifies the jigging, reduces distortion, cuts down the amount of straightening, machining and assembling you'll have to do.

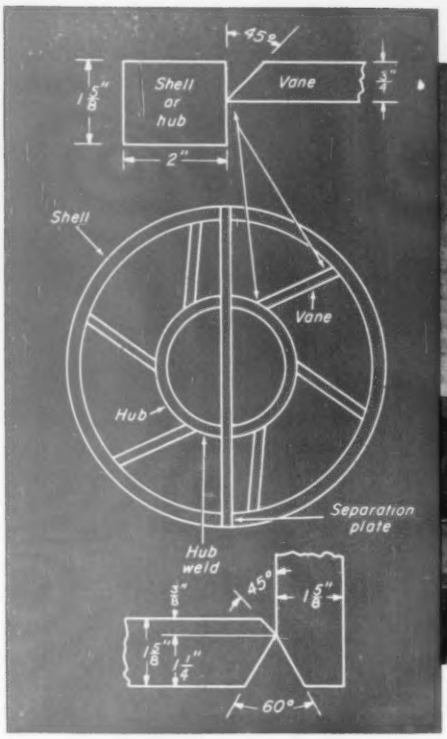
Manufacturing methods influence the styling of a product. For example, castings usually have radius corners and slopes to avoid moulding and pouring problems. The radius corners and slopes make the average casting look better than weldments. Castings naturally have a pleasant, smooth, somewhat antique look. Weldments usually look more modern.

It's not so easy to make a good looking weldment. Even their greatest admirers admit that weldments often look choppy. We must try to bring them up to modern castings in appearance. We need engineering talent that's familiar not only with engineering design and shop fabricating techniques, but also with an appreciation of good looks in a weldment.

Where castings are used they should be precision fabricated so they fit into the assembly. This is also true for forgings, extrusions and other shapes. Usually the shape needs a flange or web that can be machined, torch cut, or sawed to fit. If a weldment using these different shapes is handled properly, you'll get a low cost, nice-looking product.

Distortion in welding can be generally held to a fraction of that of castings. In welded fabrication an allowance of ⅜" or ½" at all faces for machining is not economical. You can hold the machining allowance at each face as low as 1/16" to a maximum of ¼" with an average of ⅛" to 3/16". Prevent additive tolerances when you design so that machining can be incorporated on subassemblies during fabrication. This can be a definite advantage. • •

NEXT MONTH: The author discusses standardization and joint design. He explains what standardization is and where it fits into welded fabrication. He also explains joint design and tells what happens to welded design when you select the improper joint.



CERTIFIED OPERATOR welds carbon steel vane to chrome-moly shell with E9016 low hydrogen electrode and AC power source. Preheat temperature of 450°F is maintained during welding.

Welding Chrome-Moly To Carbon Steel Calls For Low Hydrogen Electrodes

IN BRIEF: Warpage and shrinkage are held within $\frac{1}{16}$-inch by good joint design and correct preheating, welding and stress relieving procedures.

WHEN IT COMES to fabricating and welding chrome-moly steel the R. C. Mahon Company, Detroit, has the answers. If they hadn't had these answers, they couldn't have fabricated twenty-four 4850-pound gas turbines. The turbines have 3 main parts: cylinder, hub and vanes. The cylinder is a chrome-moly steel (ASTM 356-52T). The hub is of carbon steel plate (ASTM-A283 grade C) and so are the six vanes which connect hub and cylinder.

To make the hubs Mahon flamecut and roll-form them. The six vanes are also flamecut and their bevel weld joints are machine beveled. The six vanes are then welded to the chrome-moly cylinder and to the carbon steel hub.

Here's how Mahon uses the metallic arc process to make these weldments. They join the chrome-moly cylinder to carbon steel vanes with E-9016 low-hydrogen electrodes, $\frac{1}{8}$, $\frac{5}{32}$, and $\frac{3}{16}$ inches in diameter. This electrode is meant for welding 2.25% Cr-1.0% Mo steels. It is excellent for use on high pressure and high temperature piping applications. Welding is done with A.C. machines at recommended amperages. Each cylinder takes about 50 pounds of weld metal.

For welding the carbon steel hub and for joining carbon steel vanes to it Mahon uses an E-6020 electrode. They picked this electrode because of its high speed in down hand and horizontal fillet welding. They found the fillets it produces are less concave. Welds have a smooth finish, high ductility and good notch toughness. Here they also used A.C. welders to do the job. Each hub takes about 10 pounds of E-6020 electrode.

Joint design: All weld joints were beveled for complete penetration. Mahon uses 45° and 60° bevels wherever possible. Bevels on the hub $1\frac{1}{4}$ inch deep: the vanes $\frac{3}{8}$ inch deep. The sketch above shows the joint details.

Welding: Mahon preheats and maintains 450°F on the gas turbine weldment during welding. The photo shows the torch pipe and sheet metal hood that helps keep the weldment

continued on page 61

Here are 8 reasons . . .

You Should Replace Castings With Weldments

IN BRIEF: Replacing cast parts with welded ones has helped American Pulverizer Co., St. Louis, to reduce manufacturing costs.

CASTINGS HAD BEEN USED exclusively in the manufacture of American Pulverizer Company's crushers, grinders, shredders and choppers; these were bolted together. Now, in lieu of castings, to a substantial extent, welded plate sections are bolted together. The reasons why manufacturing costs were cut are as follows:

1. Fewer sections: There are less welded plate sections, so there is less bolting.

2. Distortion: Castings were often distorted. Some even had to be returned for straightening. With welded sections there is a more accurate fit-up. Careful welding keeps distortion to a minimum.

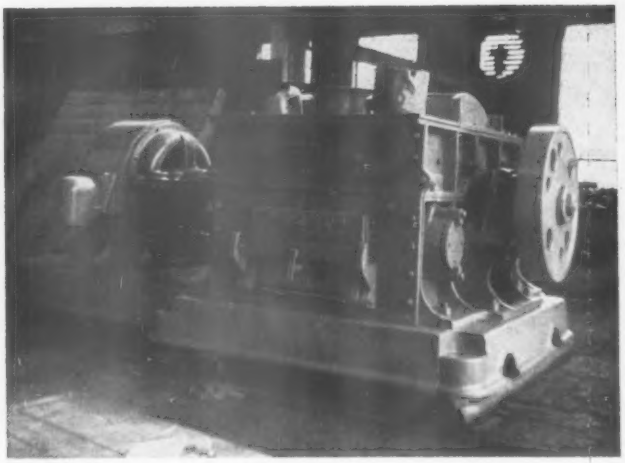
3. Machining: With castings, extra stock had to be allowed for this purpose. Base plates, which are the most difficult to handle, had to be machined on both sides. Further, in castings, all bolt holes on housing flanges had to be spot faced to seat the bolts properly. Since there was some sand in the casting, wear and tear on tools by inclusions exceeded that of normal operations. With welded parts, less machining stock is needed. Tool bits hold up better; spot facing is unnecessary because of the smooth surface of the fabricated sections.

4. Defects: Hidden defects in castings are sometimes uncovered in machining operations. If this happens the casting must be scrapped and the machining time is lost. With hot rolled steel used in welding there is not the same possibility of defects.

5. Weight: Frequently, through the use of welded parts the weight of a machine is reduced and the tensile strength increased in certain of the component parts.

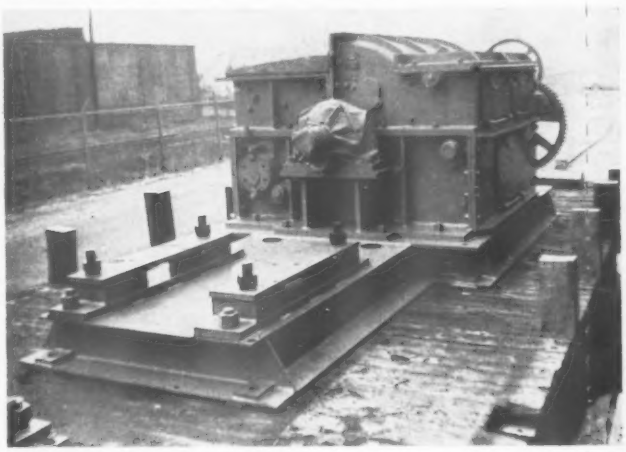
6. Storage and pattern maintenance: The elimination of patterns and the reduction of storage space required for castings is important. Further, the elimination and maintenance of patterns is a saving. Weldments require no pattern storage nor pattern maintenance. Steel plates are stored horizontally on top of each other, or stand vertically next to each other.

continued on page 61



OLD crusher with its all-cast housing and cast base plate presented eight problems which had to be eliminated.

NEW crusher with all-welded housing and welded base plate is easier to make, looks better and costs less.



FLEXIBILITY of flame cutting and semi-automatic submerged arc processes is the key to successful change.

Your Guarantee of Genuine EUTECTIC "Low Temperature Welding Alloys"

Original EUTECTIC Helps You obtain superior welds with Highest Strength and Maximum Machinability.

In the months to come, "Little Hugh-Tec" will make his appearance in shops throughout the country, on labels and packages, to identify the Original and Genuine Eutectic "Low Temperature Welding Alloys"® that Help You to obtain the finest welds with maximum machinability and highest strength.

The many advantages associated with the use of EUTECTIC "Low Temperature Welding Alloys" are based on proven techniques that apply only to our products which permit low heat input welding. Through the use of our alloys and techniques, you can bond metals below the critical range and thus reduce to a minimum the warping and distortion that is associated with high-heat methods. You wouldn't attempt to use a 400 ampere motor generator to weld 24 gauge material, and you would be just as much in error to attempt to use conventional rods with techniques developed for EUTECTIC "Low Temperature Welding Alloys".

The whole concept of low heat input welding, pioneered and developed by our company over a period of fifty years, is based on a phenomenon of surface alloying, without diffusion of the parent metal, first discovered by J. P. H. Wasserman, the founder of the company. Today, the EUTECTIC Welding Alloys line consists of over 160 products that are manufactured and sold throughout the world. Many of the products and processes responsible for this growth are protected by over 100 U.S. and foreign patents that prevent imitation, and your surest guarantee of successful welding is your insistence on only those products that bear the **Genuine** label.

Weldors everywhere have come to depend on the Safer, Stronger, Better Welds that are assured through the use of EUTECTIC "Low Temperature Welding Alloys". Furthermore, no other supplier insures such an outstanding advisory and demonstration service as that offered by Eutectic Welding Alloys Corp. It maintains the largest trained field force of welding specialists in the Western Hemisphere. Whether you buy five pounds or five thousand pounds, you can obtain real assistance when and where you need it. There are no substitutes for Quality and Service and you are guaranteed of both when you use EUTECTIC "Low Temperature Welding Alloys".

ORIGINAL Low Temperature EUTECTIC WELDING ALLOYS

®REGISTERED TRADE MARK OF:

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EUTECTIC WELDING ALLOYS CORPORATION
40-40 172nd STREET FLUSHING, N.Y.

For More Information Circle No. 32 on Reader Service Card.

Lincoln

WELDYNAMICS

Sixteen 50-foot coach frames are assembled, welded and painted on this jig in one day.

SWITCHES ELECTRODE . . . SAVES $8,000

Guerdon Industries, Inc. of Newton, Kansas, builders of "Great Lakes" mobile homes, have doubled welding speed on undercarriages by a seemingly simple switch of electrodes.

Actually, the change was made as a result of a painstaking study by Ken Rymer, Guerdon's Welding Foreman; James Mandrut, Plant Superintendent and Bob Clemens, Lincoln's welding engineer in the area.

The frames consist of 13 gauge formed cross members welded in a jig to 12 gauge channels which form the longitudinal members. Length varies from 14 to 50 feet. Welds are made in vertical down and flat position and are of short duration thus requiring good restrike characteristics. The electrode also must combat light scale and oil.

Tests proved that Fleetweld 37, Lincoln's E-6013 electrode at 250 amps was twice as fast as the E-6010 rod previously used. Also cleaning time was greatly reduced because Fleetweld 37 has very little spatter.

At the present time, Guerdon's Newton plant turns out 16, fifty foot frames a day on one jig. Savings are averaging over $8,000 per year over the previous method.

Fleetweld 37 electrodes are ideal for short, high speed welds. Light rust and oil are no problem.

Mr. Mandrut states, "We look on Bob Clemens as our own welding engineer. He's always ready to tackle and solve our welding problems."

For help with procedures and cost reduction ideas, call your Lincoln welding engineer today.

Guerdon's Jim Mandrut, "Lincoln engineering service is outstanding."

WELDIRECTORY AIDS ELECTRODE SELECTION

Matching the electrode to the job for the most efficient welding is greatly simplified by the new Weldirectory of Mild Steel Electrodes.

Electrodes are grouped according to performance characteristics, and each electrode is discussed individually so that the user can determine exactly which electrode best suits his purpose.

The operating characteristics, procedures, application information and physicals of each electrode group is stated in detail.

The individual electrodes in the group are described and compared with other electrodes in the group in light of the particular applications for which they are designed.

Write for your copy of Lincoln Bulletin 7000.1.

For More Information Circle No. 50 on Reader Service Card.

NEWS ABOUT ARC WELDING AT WORK CUTTING COSTS

HOW FLORI PIPE CONTROLS QUALITY AND COSTS . . . MEETS DELIVERY DEADLINES

Keeping quality up, costs down and still maintaining delivery of prefabricated pipe sections is a tough job for anyone. But even on such vast piping jobs as Tidewater Oil Company's Delaware refinery it is all in a day's work to the Flori Pipe Company of St. Louis, Missouri. Flori is one of the nation's leading fabricators of high pressure pipe for the petroleum and petro-chemical industry.

Flori's Welding Engineer is Ken Notvest. He is responsible not only for welding methods and procedures, but also for maintaining the high degree of welding quality required on the special alloy pipe work in which Flori specializes.

Better quality, lower cost when Lincoln mild steel wire and alloy fluxes are used on high pressure pipe.

Jetweld LH-70 gives 99% X-ray acceptance.

Mr. Notvest has developed some excellent procedures for manual welds. He uses Fleetweld 5-P, a Lincoln E-6010 electrode, for root beads in carbon steel pipe and follows with Jetweld LH-70, a low hydrogen E-7018, for cover passes. This gives them 99% X-ray acceptance on open gap welds without backing rings.

After testing many different electrodes for this application Mr. Notvest believes Jetweld LH-70 to be superior for deposition rate, appearance, out-of-position welding, and as-welded low temperature impact strength.

Flori also has many automatic submerged arc welding applications in their pipe fabricating plant. They once welded alloy pipe with alloy wire and neutral flux. However, as a result of a survey conducted in the plant by John Lucas, a Lincoln welding engineer, they have found that Lincoln alloy fluxes (mixed especially for them), and mild steel wire cut material costs by two-thirds—cut welding time in half and make better welds.

Mr. Notvest claimed, "When we invited the Lincoln man to survey our operations we had no idea that the result would make such substantial savings."

For cost reduction ideas and help with procedures, call your Lincoln welding engineer today.

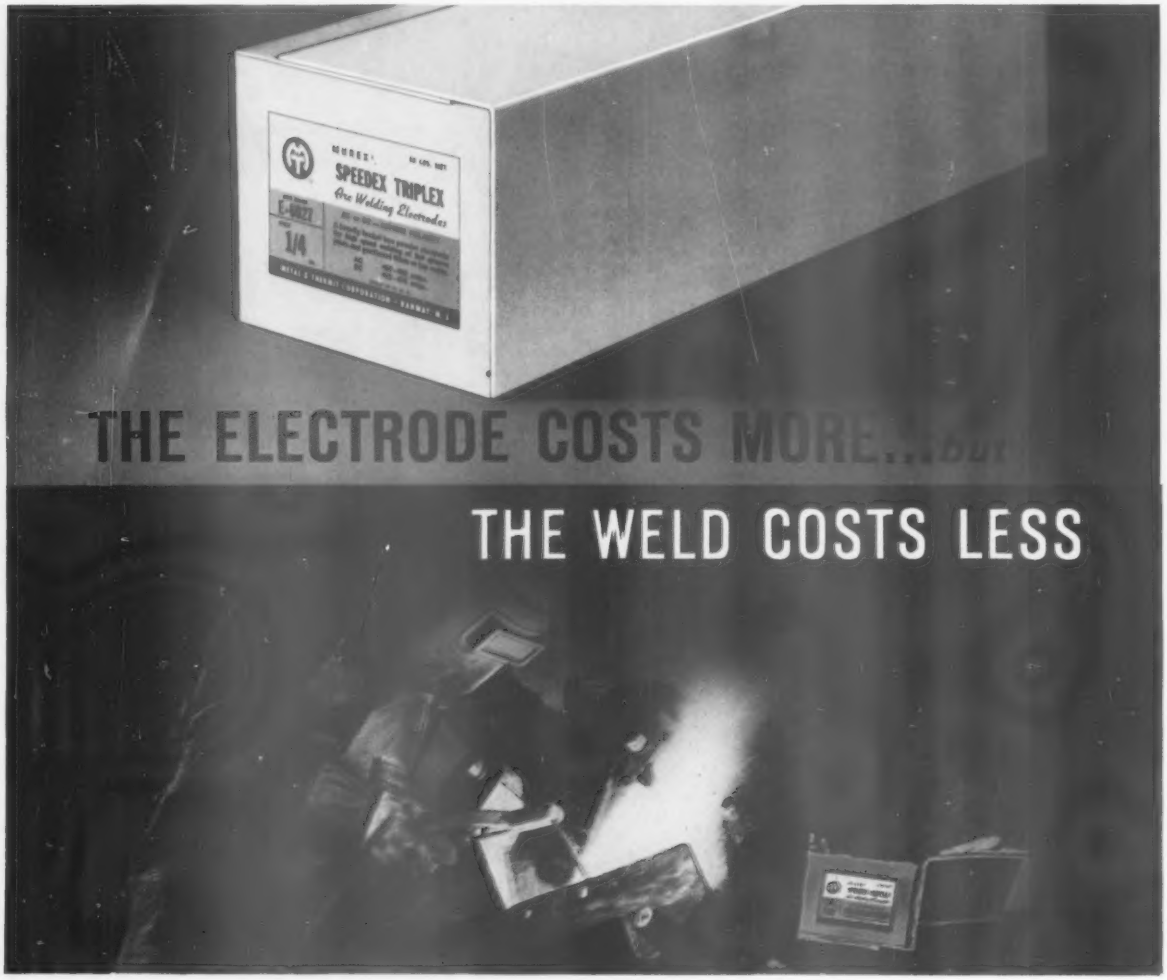
Ken Notvest, Flori's Welding Engineer, examines a weld from the inside with the "Bore Scope" he designed and built.

The LINCOLN ELECTRIC CO.

Dept. 1855 • Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

For More Information Circle No. 85 on Reader Service Card.



See how downhand welding costs go down with Speedex Triplex iron powder electrodes

Comparable electrodes:	Conventional 5/16" E-6020	1/4" Triplex
Electrode cost per lb.*	$0.160	$0.220
Melt rate, lb. per hr.	16.60	22.40
Cost of metal melted per hr.	$2.656	$4.928
Deposit rate, lb. per hr.	11.75	17.31
Metal cost per lb. of deposit	$0.226	$0.285
Average hourly labor cost	$2.51	$2.51
Labor cost per lb. deposit	$0.213	$0.145
Cost of labor and electrodes per lb. deposit.	$0.439	$0.430

Now add your overhead and the faster production makes the saving all the more substantial

*1,000-20,000 lb. price

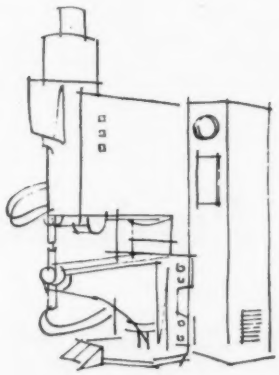
WITH heavy weldments that can be fabricated in the downhand position, a cheaper electrode proves no real economy. Not when you can deposit better than 17 pounds of metal per hour for a lower *end cost* with Speedex Triplex electrodes.

Compare the representative figures on comparable electrodes. No question but that you save money.

Fastest of the MUREX® line, Speedex Triplex modified E-6027 electrodes have an extra heavy iron powder coating. They produce X-ray quality welds with either drag or open arc technique. Ask the MUREX Man about them. Or send for bulletin. METAL & THERMIT CORPORATION, Rahway, New Jersey.

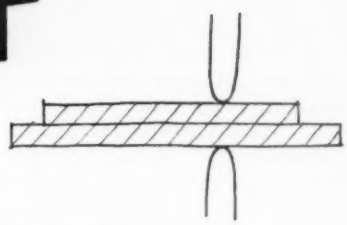
MUREX
PRODUCTS FOR BETTER WELDING

For More Information Circle No. 54 on Reader Service Card.



SPECIAL REPORT:

RESISTANCE WELDING



THE RESISTANCE WELDING PROCESSES have become so diversified that hardly a manufacturing or metal fabricating plant does not use one of them. Spot, seam, flash and projection welding have made possible the quantity and quality production of a host of products never before contemplated . . . at the greatest possible economy of labor, machinery and material. Advances in the design of machines, controls and electrodes continue to enlarge the scope of resistance welding applications. This report covers some of those developments.

EDITOR'S NOTE: These people helped in the preparation of the comprehensive control selection chart appearing on pages 40-41:

Robotron Corp.: Charles Buhler, secretary-treasurer

Raytheon Mfg. Co.: Patrick J. Duran, assistant products manager

Sciaky Bros., Inc.: Leo Gilbert, regional manager, Cleveland, Ohio, and Dave Adair, assistant district manager, Cleveland

Square D Co.: J. W. Brown, application engineer

Swift Ohio Corp.: E. J. DelVecchio

Taylor - Winfield Corporation: F. R. Woodward, assistant to chief sales engineer; John E. Mallet, district manager, Cleveland, and Raymond C. Jones, sales engineer

Vacuum Tube Products, Division of Hughes Aircraft Co.: J. J. Sutherland, manager

Weltronic Co.: Leonard R. Broniak, general sales manager

RESISTANCE WELDING

Should You Lease Resistance Welding Equipment?

questions and answers on equipment leasing by

ROBERT SHERIDAN, *president*
Nationwide Leasing Company
Chicago, Illinois

Q: *What is the volume of equipment leasing in the welding industry?*
A: At the end of 1958 there was approximately $1 million worth of equipment on lease in the welding industry of approximately $29 million on lease to metals and machinery manufacturers as a group. The total volume figure represents a gain of about 34 percent in one year. In the same 1958 period, welding manufacturers leased approximately $2.5 million worth of machinery to their customers.

Major reasons why welding manufacturers have begun to lease equipment in increasing amounts are: (1) to conserve working capital and (2) the high cost of equipment.

These are the same reasons why the industry's customers have shown greater interest in leasing. For the welding machinery manufacturer, leasing is a sales tool which permits him to offer 100 percent financing and long terms for big expensive installations (such as resistance welding), while receiving immediate cash payment in full from the leasing company. This means more sales.

Q: *What is the volume of equipment leasing by U.S. industry?*
A: At the end of 1958 there was approximately $227 million worth of production equipment on long-term lease throughout U.S. industry.

Q: *What is equipment leasing?*
A: Equipment leasing is a method of obtaining the use of income-producing equipment (fixed assets) without capital investment. When equipment is obtained in this way for use in production, the units remain the property of the leasing company. The lessee pays the leasing company a fixed charge for a stated period for using the equipment.

Leasing is a long-term arrangement, normally from three to 10 years. In some cases it may be as little as two years or as long as 15 years. It is different from equipment *rental*. This is a short-term affair in which the rental firm rents out new or used pieces for brief period, reclaims them at the end of the period, and then rents the equipment to other users.

Q: *How does equipment leasing work?*
A: A company which wishes to lease equipment from Nationwide Leasing Company, for example, submits an application describing itself, its business and its financial position. It lists the specific manufacturer from whom it wishes to secure the equipment, the price of the equipment, the length of the lease terms it desires, and the form of payment it desires. The leasing company then purchases the equipment and arranges for its shipment directly to the lessee's plant or store. Upon acceptance of the equipment, payments start. All equipment, no matter how many items are involved, can be covered by a single master lease and can be paid for in a single monthly payment. This is true regardless of how many suppliers are involved. This reduces the user's bookkeeping considerably.

Q: *What types of equipment are leased?*
A: All types. In 1958, equipment leased ranged in cost from a $17 hand truck (part of a $140,000 equipment lease with a midwestern hospital) to $5,000,000 worth of construction equipment. Both standard and specially-built units can be leased.

Q: *Why has equipment leasing increased so rapidly?*
A: Basically, equipment leasing has increased as a result of the steadily increasing cost of capital equipment. Leasing has historically been a means of permitting businessmen to function without owning everything they need to do business. Specific reasons for the current growth of equipment leasing are:

1. Profit-producing equipment is put to work without capital investment.
2. To increase profits without increasing a company's own capital investment.
3. To increase production without reducing liquidity of working capital.
4. To reduce the risk of loss caused by rapid obsolescence of specialized equipment.
5. To obtain equipment for limited-term use, either for special orders or for developmental or research work, contract work.
6. For manufacturers of industrial equipment, leasing programs have proved to be an effective method of increasing sales.

Q: *What are the advantages of leasing?*
A: Other advantages lie in how leasing improves a company's financial situation:

1. Leasing offers financing without dilution of ownership or control.
2. In leasing, there is no necessity for a periodic cleanup of funds or a pledge of receivables.
3. Leasing may offer certain tax-timing advantages in specific instances.
4. Only the lease payments due within 12 months appear on the balance sheet, thus affecting the ratio of current assets to current debt very little. As a result, a company is able to use its established lines of credit for short-term borrowing without disturbance.

Q: *What is the length of equipment lease terms?*
A. Terms range generally from three to 10 or longer. In some cases where smaller sums are involved, they can be as little as two years. The user determines the length of lease he prefers arranges the payments to suit his own needs.

EXPERT ADVICE NEVER HURTS: *A complete analysis of the comparative cost of leasing and other financing methods, called "Lease or Buy? Comparative Costs of Equipment Acquisition," has been developed by the Foundation for Management Research. Single free copies may be had by writing to the Foundation at 121 West Adams Street, Chicago 3 Illinois.*

Readers may obtain an analysis of their situation, without obligation, by writing to the author: Robert Sheridan, president, Nationwide Leasing Co., 11 South LaSalle St., Chicago 3, Illinois.

Q: *How does leasing compare with other methods of financing?*
A: Leasing offers 100 per cent financing and provides a welding machinery manufacturer (or his customer) with greater cash flow than any other financing method. As a result, the relative cost of leasing is less than other methods. Any expenditure of money to acquire equipment involves paying something for the use of the money. Even in the case of outright cash purchase, the welding manufacturer is sacrificing the earnings that his working cash would yield; this, in effect, is what he is "paying" for the use of his own money. In the welding machinery industry this means a "cost" of 34 percent—the average *before-tax* rate of profit on net working capital the industry earns.

Q: *What are recent trends in leasing?*
A: Two new trends have shown themselves: (1) the sale-leaseback transaction (commonly, but erroneously, termed purchase-leaseback) and (2) merchandising-leasing plans involving the cooperation of equipment manufacturers and a leasing company to increase sales.

In the sale-leaseback transaction, a company builds a new plant, sells the equipment and facilities to the leasing company as soon as it is completed and ready for use, and immediately leases it back. *Often this is done with older plants also.* This enables firms whose financial ratios would not otherwise permit them to expand at so great a rate, to do so without straining their capital structure.

Q: *What operating situations make leasing most advantageous?*

a. In general, where companies can expand their operations profitably, if additional equipment and machinery were made available at smaller annual expense than through use of their own capital.
b. Companies which find themselves short of working capital but which have sufficient equipment, can remedy the situation through sale-leaseback transactions.
c. Companies faced with competition that is using the latest equipment, while they themselves lag on cost-saving.
d. Companies which hold a tight check rein on capital expenditures and financial ratios. Leasing permits the management of these companies to secure new equipment without forcing the board of directors to raise more capital.
e. Where rapid obsolescence is a strong possibility, leasing bypasses the problem of capital investment in such equipment.
f. For pilot plants, developmental or experimental projects, leasing offers a means of opening new areas of production without draining working capital on such unproved ventures.
g. Companies engaged in defense contract work are often enabled, through leasing, to obtain needed equipment only for the term of the contract.

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	SINGLE PHASE CONTROLS					
	NONSYNCHRONOUS		SYNCHRONOUS	HEAT CONTROL	SLOPE	
	MAGNETIC	ELECTRONIC			UP	DOWN
PRINCIPAL APPLICATIONS	General spot, projection, and flash welding applications.	General spot, projection, and portable gun welding. Especially desirable where high speed is necessary.	Used for nonferrous and ferrous. Used where precision and accuracy is important. Light gage stainless steel or any light gage metal.	Where vernier and stepless heat adjustment is needed. Simplifies very many difficult welding jobs.	Coated metal and nonferrous applications, spot and projection applications.	Non-ferrous. Principally spot welding aluminum.
ADVANTAGES	Low initial cost. No water cooling required.	High speed, good accuracy. More consistent results at short weld times. Fairly low maintenance.	Highly accurate and precise timing, more consistent results. Eliminations of transients.	Fine control without adjusting of transformer taps.	Reduces pick-up, minimizes expulsion. Longer tip life.	Some degree of annealing. Reduces rusting of coated metals.
LIMITATIONS	Smaller KVA welders. Noisy. Maintenance fairly high.	Costs a little more than magnetic.	Costs more than nonsynchronous. Available resistors accurate only to ±1%.	Additional cost.	Additional cost. Slows up operation.	Additional cost. Slows up operation.

What Type Resistance We

WHEN YOU BUY CONTROLS for resistance welding remember that each has its advantages and limitations. Keep your eyes on the job you expect it to do. But, remember that while a single type may do the job, you may have to change the welding control if you change the shape or size of the part or the material.

Price is important, of course, but it is not the last word. Chances are you will decide on a particular type of resistance welding control for a particular application—and you'll have to pay the price. Where there's a choice of control types, you'll weigh the advantages and limitations. Remember most controls consist of a few basic functions. By adding functions you make the controls more complex and applicable to a wider range of jobs. Here are the major types of controls and their functions.

SINGLE PHASE CONTROLS

Nonsynchronous—

Electronic contactors called ignitrons and thyratrons are switching devices which use electronic tubes instead of mechanical switches to start and stop primary current. Use ignitrons for currents over 40 amps, thyratrons for 40 amps and under.

Electronic contactors are valuable where you handle high currents and where your operations are rapid. When you use electronic contactors you get rid of the noise and maintenance of mechanical contactors. However, electronic contactors operate at rated capacities. Follow the manufacturers' rating charts for best results.

Synchronous—

A *magnetic contactor* is a current carrying contact that is actuated by an electromagnet. You can get them for single-pole, double-pole and synchronously interrupted magnetic contactors that open the power circuit when the AC wave approaches zero. Magnetic contactors are classified in six sizes. Each classification

3-PHASE CONTROLS					
PREHEAT, CHILL & TEMPER*	FORGE TIMING*	NONSYNCHRONOUS	SYNCHRONOUS		
			COMMERCIAL	MILITARY	
				Standard RC Circuit	Dekatron
Air hardenable steels. (like stainless)	Heavy thickness welding or aluminum welding. Used for spot, projection, forging and upsetting. Must be used on military work.	Load distribution controls and multispot in automotive welding. All weldable alloys not requiring accuracy.	Can weld highly conductive materials such as aluminum and magnesium and low conductive metals such as alloy steels, stainless steels, and nickel base alloys. Heavy projection welding such as annular rings.	General aircraft, airframe, and military fabrication—where spec welds are necessary.	Metals used in jet engine, missile, and AEC projects. Any long weld sequence requiring repetitive accuracy.
Prevents cracking and brittleness. Stress relieves, anneals and reduces surface refinishing.	Stronger nugget. Finer grain structure. Improves metallurgy all the way through. Increases range of welding applications.	Permits distribution of load. Good for large multispot applications.	Greater flexibility in welding all metals. Greater weld consistency, longer electrode life. Balanced load. 80% or better power factor. Lower installation costs and no current compensators.	More refined control. Fineness gives better metallurgical properties.	Simplicity of setup. Almost no maintenance. No variable resistors to adjust.
Additional cost. Slows up operation.	Additional cost. Slows up operation.	Complex circuitry, cost high.	Higher initial cost (compared with single phase).	Initial cost higher than commercial type.	Initial cost higher than standard RC circuitry.

*Functions used for single phase and 3-phase.

ing Control Do You Need?

gives the nominal and maximum ampere ratings the contactors are designed for.

Magnetic contactors have the advantage of low cost. The limitations are: Fairly frequent maintenance and, for rapid welding, an inability to consistently control short weld times.

SEQUENCING AND TIMING DEVICES

Weld timing controls are of two general types; *nonsynchronous* and *synchronous precision*. There are several kinds.

Nonsynchronous timers start and stop the flow of welding current at any time with respect to the line voltage wave form, since the opening and closing of the contactor is not necessarily synchronized with the line voltage, wave form. Various points affect the accuracy of this type of timer, and could affect AC frequency as much as ± one cycle. Because there are many applications with long timing periods that aren't much affected by this deviation, nonsynchronous timers are widely used. When time periods are more critical, synchronous controls are the best.

Electronic timers are devices in which the timing is based on the change in voltage across capacitors or inductors, which are either discharged or charged through values of resistances which are adjustable. These voltages are normally applied to grids of electronic tubes to build up the desired sequence by conduction of the tubes.

Pneumatic timers are a mechanical device, consisting of electrical contacts actuated by delay mechanisms involving the transfer of a small volume of filtered air from one chamber to another. A regulated orifice determines the speed of transfer of air, and therefore the length of the timing period. A needle valve with adjusting knob is used to set the timing period. The time setting is usually indicated in cycles on a calibrated dial geared to the needle valve.

Motors: If a motor has a constant operating

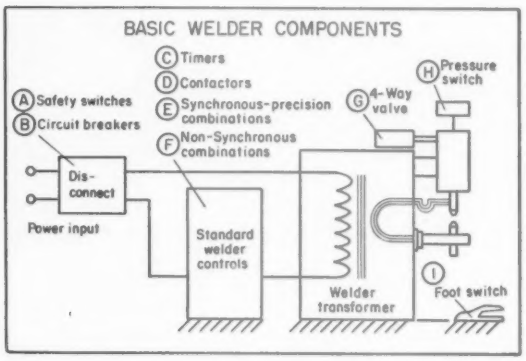
RESISTANCE WELDING CONTROLS

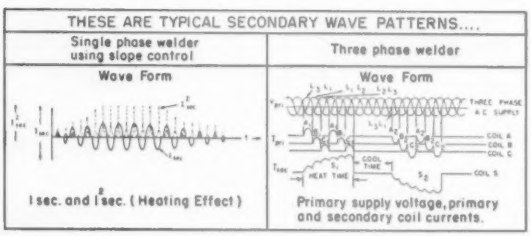
continued from page 41

speed you can use it for a timer. Cam-operated contacts close and open the circuit to the operating coil of the welding contactor. Sometimes a clutch is used to engage and disengage the cam shaft, allowing the motor to run continuously. Occasionally the cam shaft is directly connected to the motor that is then started and stopped at the beginning and end of each timing period.

Synchronous Precision Timers. Close and open the primary circuit of the welding transformer at precisely the same point on the voltage wave in making each weld. The current wave form is consistent and the time of current flow through the welding transformer is the same for consecutive operations.

Control of the time at which the power circuit closes is vital for precise results. If the highly inductive circuit characteristic of a welding transformer is connected to the power circuit at





a point corresponding to zero current (if current were flowing), then no transient will occur and the current during the first half-cycle will be practically the same as the steady state current throughout the weld. On the other hand, when the power circuit is closed at the time the current would be maximum (if current were flowing) a transient current results in the primary. Peaks are greater in magnitude than those corresponding to normal or steady state currents. The transients in the secondary winding of the transformer are not so great, but they are sufficient to materially affect the energy delivered to the weld.

Sequence and Sequence Weld Timers: for repetitive spot or projection weld a complete cycle consists of four steps in this sequence: (1) *Squeeze time:* Time interval between pressure application and the application of welding current, (2) *Weld time:* The interval during which current is allowed to flow through the work for making of one weld, (3) *Hold time:* Time pressure is held at electrodes after the cessation of the welding current, (4) *Off time:* Time that one or both electrodes separate from work.

If the weld timing is nonsynchronous, the timer may be built into and be an integral part of the sequence control. Such units are called *sequence weld timers.* When weld timing is synchronously controlled and the sequence of welding machine operations is timed, the units are called sequence timers.

Standardized Classification for Welding Timers and Sequence Controls: Welding timers and sequence controls have been standardized in several basic types. These fit most commercial resistance welding applications.

The National Electrical Manufacturers Association (NEMA) classifications are listed here:

Timers—Standard Types

NEMA Type 1-A—Weld Timer. This is a simple, nonsynchronous timer which controls weld time only. It is used for single-impulse spot welding on cam-operated machines or where a maintained pilot contact is provided.

NEMA Type 1-B—Multiple-Impulse Timer. This nonsynchronous timer controls only the heat time, the cool time and either the weld interval or the number of heat times. It is used for single- or multiple-impulse spot welding.

NEMA Type 3-B — Sequence-Weld Timer. This is the most popular nonsynchronous timer for single-impulse spot welding. It controls squeeze time, weld time, hold time and off time. It may be used with or without nonbeat control. (Nonbeat control means that the initiating switch cannot control the operation, once started.)

NEMA Type 3-C—This nonsynchronous timer controls squeeze time, weld time, hold time and off time. It is used for single-impulse spot welding.

NEMA Type 5-B—Sequence-Weld Timer. This is the same as the 3-B control except that it provides for weld interval, heat time and cool time and may be used for multiple-impulse spot welding.

NEMA Type 7-B—Sequence Timer. This is the same as the 3-B control except that an external synchronous weld timer is required to control weld time.

NEMA Type 9-B—Sequence Timer. This is the same as the 5-B control except that an external synchronous weld timer is required to control weld time.

ACCESSORY DEVICES

Heat Control. You control heat or welding current by changing (1) the secondary voltage of the welding transformer. For one to eight

continued on page 57

Westinghouse tube engineering...
serving the nation through imagination

DRAMATIC PROOF

that Westinghouse IGNITRONS are built to take it!

The high-peak current conduction capacities of a standard Westinghouse WL 5550 ignitron tube were recently demonstrated in hydrogen fusion experiments at a leading Western university. In this application, ignitrons successfully held off capacitor voltages of 10 kilovolts, and when fired, currents from 30 to 45 thousand amperes were discharged.

Since inventing the original ignitron tube, Westinghouse engineers have introduced a succession of significant improvements—including a water-saving ignitron with a thermostat. Next time you need an ignitron replacement, investigate the dependable, efficient ignitron series offered by the company that originated them . . . Westinghouse!

YOU CAN BE SURE... IF IT'S Westinghouse

Electronic Tube Division, Elmira, N.Y.

For More Information Circle No. 83 on Reader Service Card.

COPPER-BASE ALLOYS

	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5
Ampco Metal, Inc.	Ampcoloy 99	Ampcoloy 97	Ampcoloy 95	Ampcoloy 83	Ampcoloy 92
Acme Electric Welder Co.	Acmeloy	Superloy	Stainaloy	Hardaloy	Not Available
Beryllium Corp.	Not Available	Not Available	Berylco 50	Berylco 25	Not Available
Eisler Engrg. Co., Inc.	Eisler E	Eisler 3	Eisler 100	Eisler 73	Eisler ED
Electroloy Co., Inc.	Electroloy A	Electroloy XX	Electroloy TX	Electroloy B	Electroloy Molin 2
P. R. Mallory & Co., Inc.	Elkaloy A	Mallory 3	Mallory 100	Mallory 73	Elkaloy D
S-M-S Corp.	Alloy 101	Alloy 103	Alloy W-5	Alloy W-2	Alloy 116
Tipaloy, Inc.	Tipaloy 100	Tipaloy 130	Tipaloy 200	T2	T-116
Tuffaloy Department, Air Reduction Sales Co.	Tuffaloy 88	Tuffaloy 77	Tuffaloy 55	Tuffaloy 44	Tuffaloy 66
Weldaloy Products Co.	Weldaloy 10	Weldaloy 20	Weldaloy 30	Weldaloy 40	Weldaloy 50

	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5
Annealing Temperature (F°)	660°	950°	1040°	710°	....
Hardness (Rockwell)	70B	65B: Cast 80B: Wrought	95B	37C	75B
Electrical Conductivity: % I.A.C.S.	85	80: Cast 85: Wrought	45: Cast 50: Wrought	20: Cast 23: Wrought	15
Availability	Bars, Forgings	Bars, Forgings, Castings	Bars, Forgings, Castings	Bars, Forgings, Castings	Castings

Choosing And Using

IN ALL resistance welding applications the electrodes are in direct contact with the materials to be welded. They conduct the welding current to these materials, apply force to the area to be welded and dissipate a part of the heat of welding.

Resistance welding electrodes carry extremely high electrical currents, current densities ranging from 5,000 to 70,000 amps per square inch. Since the quantity of heat developed in metal conductors is directly proportional to the square of the current, time of current flow and resistance of the path, it is obvious that an electrode should have relatively high electrical conductivity to minimize heating. In fact, electrical and thermal conductivities must be high enough so heat generated at work and electrode face will be readily dissipated, preventing them from fusing.

In resistance welding operations, welding pressure on the electrode may range from 10,000 to 60,000 psi. In addition, there may be considerable impact when the electrodes are brought together at the work. To minimize deformation of the electrode face, the electrode must be made of a material having high mechanical properties (hardness, yield strength, etc.) particularly at elevated temperatures.

Commercially pure copper is an excellent conductor. However, certain copper alloys have higher annealing temperatures, greater compressive strength and better wear resistance. These desirable mechanical properties are obtained at some sacrifice in electrical and thermal conductivity.

This suggests selection of an electrode material that has the least conductivity that will produce good welds on a given application, so as to take advantages of the greater wearing properties. It should also be noted that if conductivity is too low, sticking or alloying on the electrode face results, particularly in spot and seam welding.

Copper-Base Alloys

Class 1 alloy is a superior substitute for pure copper as an electrode material. It is recommended as a general purpose material for resistance welding applications. It may be used as spot welding electrodes, seam welding wheels, seam welder shafts, flash and butt welding dies,

COPPER-TUNGSTEN ALLOYS

	CLASS 10	CLASS 11	CLASS 12	CLASS 13
Acme Electric Welder Co.	Tungstenite 40	Tungstenite 42	Tungstenite 43	Tungstenite 80
Ampco Metal, Inc.	Ampcoloy 3W1	Ampcoloy 3W10	Ampcoloy 3W20	Ampcoloy W-100
Eisler Engrg. Co.	E-1W3	E-10W3	E-20W3	E100W
Electroloy Co., Inc.	Electroloy 1	Electroloy 10	Electroloy 20	Electroloy 100
P. R. Mallory & Co., Inc.	Elkonite 1W3	Elkonite 10W3	Elkonite 20W3	Elkonite 100W
S-M-S Corporation	Elkonite 1W3	Elkonite 10W3	Elkonite 20W3	Elkonite 100W
Tipaloy, Inc.	T-1W	T-10-W	T-20-W	100W
Tuffaloy Department, Air Reduction Sales Co.	Tuffaloy 1W	Tuffaloy 10W	Tuffaloy 20W	Tuffaloy 100W
Weldaloy Products Co.	Weldtung 10CT8	Weldtung 20CT	Weldtung 30TC	Weldaoly W

	CLASS 10	CLASS 11	CLASS 12	CLASS 13
Hardness (Rockwell)	72-82 B	94-100 B	98-103 B	76-82 A
Density (Gr/CC)	13.5	14.2	14.4	19.2
Electrical Conductivity: % I.A.C.S.	35-42	28-32	27-31	30
Availability	Bars, Inserts	Bars, Inserts	Bars, Inserts	Bars, Inserts

Resistance Welding Alloys

projection welding dies and welder fixtures.

Because of its high electrical and thermal conductivity, this alloy is specifically recommended for spot welding aluminum alloys, magnesium alloys, coated materials (terne plate, tin plate, galvanized iron, cadmium plate), brass and bronze.

Class 1 alloy is not used in cast form.

Class 2 alloy is a superior resistance welding electrode material recommended for high level production of spot and seam welding of clean mild steel, low alloy steels, stainless, low conductivity brasses and bronzes, nickel-silver, nickel and nickel alloys and Monel.

This alloy is suitable for projection welding dies, seam welder shafts and bearings, flash and butt welding dies and current carrying structural members.

It is available as high strength and high electrical conductivity castings for use as gun welder arms, welder platens and secondary circuit structural members.

The Class 2 alloy is heat treatable.

Class 3 alloy is recommended for projection welding dies, flash and butt welding dies, current-carrying shafts and bushings. As castings, Class 3 alloy (having higher strength than Class 2) is recommended for highly stressed welder structural current-carrying members and heavy-duty offset electrode holders.

It is not generally recommended for spot welding electrodes, but may be used advantageously for spot welding steels having high electrical resistance, such as stainless.

The Class 3 alloy is heat treatable.

Class 4 alloy has extremely high hardness and ultimate tensile strength. Its electrical conductivity is lower than the Class 3 alloy. It is generally recommended as electrode material for special flash, flash butt and projection welding applications where pressures are extremely high and wear is severe, but where heating is not excessive. It is available as wrought material for highest quality dies and electrode and may also be obtained as high strength castings. It is frequently used in the form of inserts and die facings, and may also be used for seam welder bushings.

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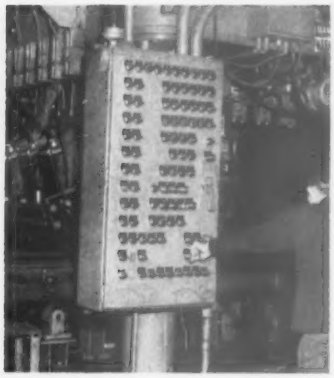
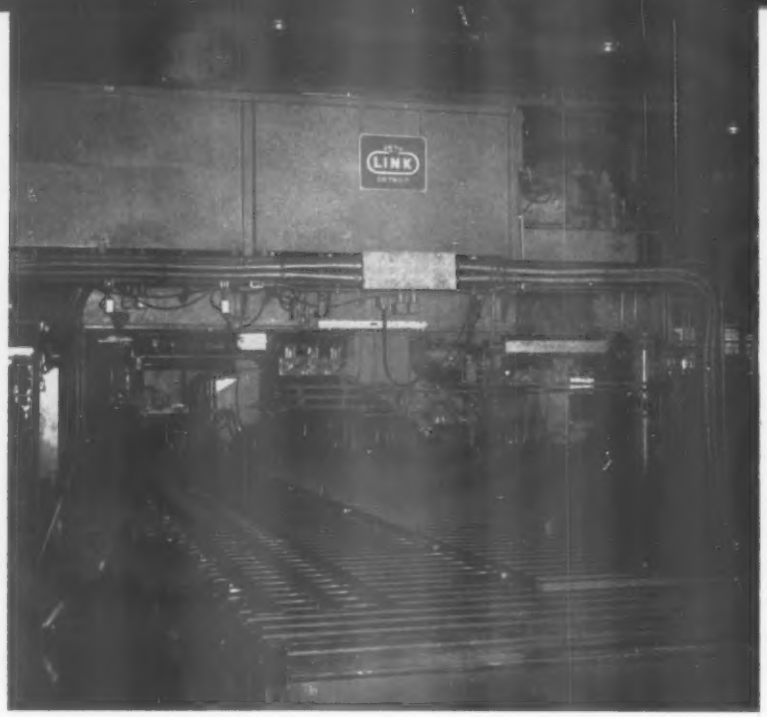


MULTI-TIP machine is controlled by one operator, fires 66 tips when probes touch corrugations.



Spotwelding Speeds Joining

IN BRIEF: Industry & Welding editors went to Fruehauf Trailer Company and Spotweld Division of Otto Konigslow Mfg. Co. for up-to-date spotwelding practice on both large and small applications.

Multi-Tip Welding

ONE OF THE WORLD'S LARGEST resistance welders, a 66 tip giant with 25 transformers, is a big producer of truck trailer side panels at the Fruehauf Trailer Company's Avon Lake, Ohio plant.

The machine is capable of producing 40 side panels a shift—enough for 20 trailers. Panels are 40 feet long, 10 feet wide, and are made from 2-foot wide corrugated sections of 22-gauge, low alloy-high tensile steel. In the same operation, top and bottom rails are welded to the overlapping sections.

Increased production and more uniform weld spacing were the prime reasons for the welder's purchase. Before, panels were welded with two portable guns, but production was only two per shift. Welds were sound enough, but equal spacing impossible—weld nuggets could not equally share the transmitted load.

The big machine is actually three welders in one; it's a series welder, a push-pull welder, and a direct welder. The controlling factor for each function is the material thickness and the number of each. Thus, most welds are made with series connected electrodes—where two 22-gauge panels are welded on 3-inch centers. Series welding keeps current draw to a minimum.

Direct welding is used where the 12-gauge rail is joined to the 22-gauge panel—to satisfy the need for more current. Three- and four-thickness joints—the rail, overlapping panels, and in some places a liner strip—require even more current for welding. Thus, the push-pull set up. Current travels from a topside transformer to one underneath the machine, a system that prevents current shunt.

The 50-ft. long by 10-ft. wide work holding table indexes hydraulically. Support surfaces are actually bottom electrodes— in the form of 80—½-inch by 4-inch by 10-ft. bars of RWMA Class III alloy, spaced two inches apart. The table travels over 60 feet so that all panel parts can reach the welding station.

Nerve centers of the machine are proximity controls—18 wire probes that contact panel corrugations, activate three positioning clamps ahead of the welding tips, and trigger the welding cycle. Probes can be set to fire electrode banks in many arrangements.

There are six banks of welding tips, each having 12 water-cooled tips and holders. Electrodes fire a few at a time (keeps current draw

continued on page 52

PORTABLE SPOTWELDER, used to join clip to panel, eliminates need for special electrode system on multi-tip welder.

SINGLE SPOT, stored energy machine, is ideal for welding aluminum; it gives high heat-short cycle time needed.

Of Sheet Metal Parts

Portable Welding

Portable spotwelding is important to the production of Fruehauf's side panels. Each panel section has a reinforcing clip welded to a corrugation in three places. A portable scissor-type gun (50 KVA), balanced for easy maneuvering, is used. The clip, like the panel, is 22 gauge low alloy-high tensile steel.

Why portable? Clip welds are made at a different plane than other side panel welds. The portable gun is easy to use and very fast; it eliminates the need for expensive tooling and a special electrode system on the multitip welder. Gun welding is a one-man operation, done while another man sets up panels on the big welder's table.

Single-Spot Welding

WHEN YOU spotweld aluminum or magnesium, take into account the narrow plastic range of those materials. Too long at welding heat will cause metal flow, force the electrodes into the pieces being joined, reduce their thickness and weaken the joint.

This is well known at Spotweld, (a division of Otto Konigslow Mfg. Co.), Cleveland resistance welding specialists. Their light-metal work is done on one of two, three phase stored energy machines, because these 50 KVA welders give the high heat-short time cycle needed. The machines operate economically too: The transformer charging time is relatively long, the current draw low (because it is spread over three phases) and the electromagnetic discharge very fast—only 1/200 of a second.

A recent aluminum job was the spotwelding of grinder hoods, an important component of high-accuracy thread grinding equipment. The material was .064-inch thick, half-hard 3S aluminum; the hood, simply designed: Two like halves, bent to form a 4½ ft. long tapered channel, were butted and 2-inch wide battens of the same material clamped under each seam for welding.

The hood drawing called for a double row of spotwelds, 2 inches apart, the length of each seam. But before halves were clamped, some very important preparation work had to be done. The aluminum components come to Spotweld, formed and beaded (for stiffening), but are usually greasy and finger-printed, and always with an oxidized surface. Unless surfaces are perfectly clean, imperfect welds will result. Thus this careful cleaning procedure:

Parts are dipped successively in four tanks. The tanks hold: Detergent (eliminates dirt and grease); hot water rinse; acid (removes oxide coating); and a cold water rinse. This half-hour

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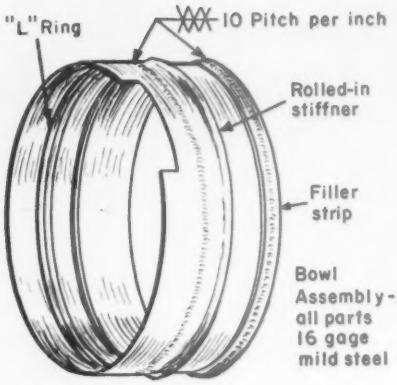
RESISTANCE WELDING

here's a job that had to be pressure-tight; the best way to get it without warpage was to seam weld



WELDING WHEELS, that join "L" ring to diesel air filter bowl ring, are angled out 1½ degrees to make them track true with each other.

Seam Welded Design Is Pressure Tight

IN BRIEF: A seam weld is a series of overlapping spotwelds; it will weld thin metals pressure-tight without distorting them.

SEAM WELDING is another resistance process used in job shop work by Spotweld Division of Otto Konigslow Mfg. Co., Cleveland. One job that requires this method over others is an oil bath air filter for a diesel engine.

The bowl assembly of the filter has to be pressure tight and the best way to get this without warpage is by seam welding. The part is a 19-inch diameter ring, 9 inches deep, made of 16-gauge mild steel.

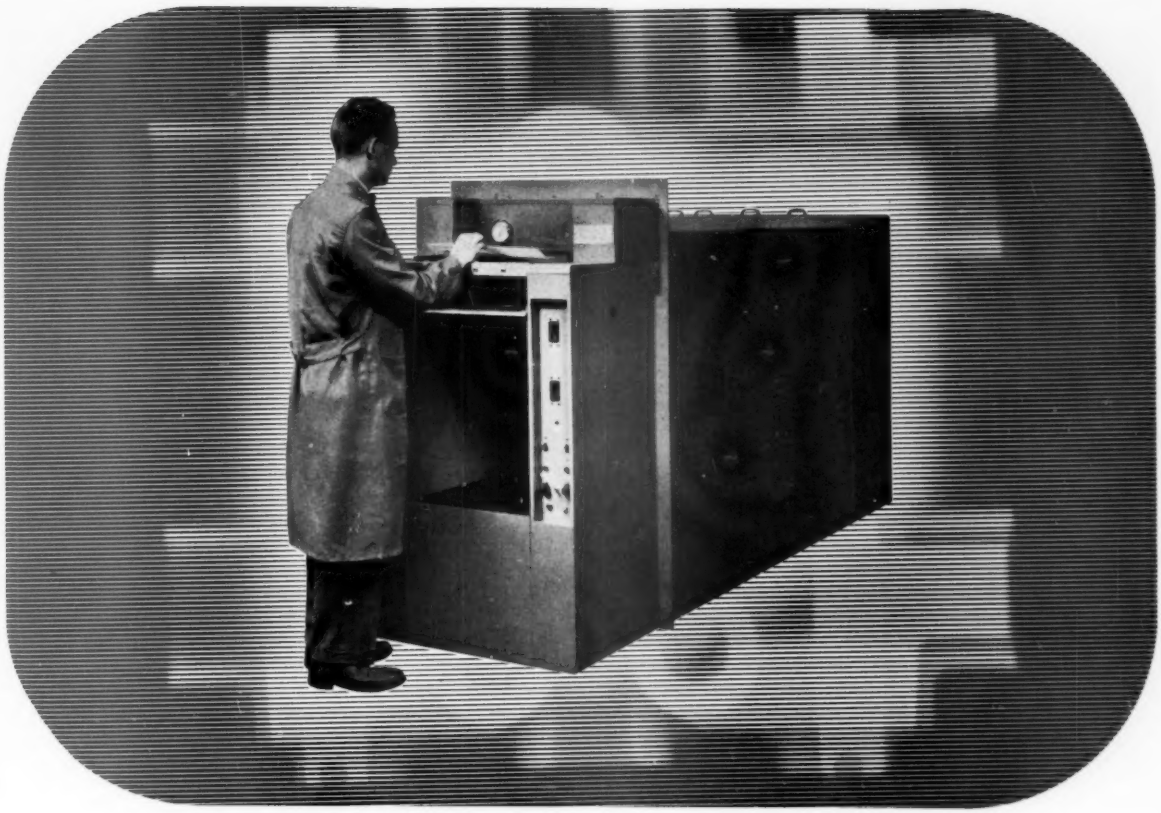
Spotweld rolls blanked strip to diameter and seam welds the closure. An important part of the design is a rolled-in stiffener in the center of the ring.

Next, the parts which are to be seam welded to the ring are spotwelded in place, with welds about every 5 inches. One is an "L" ring (or angle), the other is an 1¼ inch wide filler strip. Both are the same material as the bowl ring. The "L" ring is an internal part and is simply slipped in for tacking; the strip is quick-clamped at one end and formed around the bowl ring as it is tacked.

Seam welding is done on a single phase 200 KVA machine. Electrodes are 8-inch diameter RWMA Class II wheels, the upper one driven by a variable speed transmission, the bottom one, an idler. Electrodes are angled out about 1½ degrees to insure good tracking. (Directly opposed electrodes show the tendency to wander). Electrode contact width is 5/16-inches and is beveled into the major wheel thickness to prevent mushrooming and loss of contour. Any change in contour would sharply affect the quality and size of the weld.

Spotweld seam welds the "L" ring and filler strip to the bowl ring with settings producing five heat cycles and six cool cycles on 440 volts, with a weld force of 60 lb. This results in a ten-pitch-per-inch, continuous weld. During welding both the electrodes and the work are flooded with cooling water.

Bowl assemblies are welded (both seams) at the rate of 12 per hour. Once a day, while the job is running, a sample weld is made on similar material and peel tested. Immediately after welding, the part is plunged into a bath of soluble oil to prevent rusting. • •



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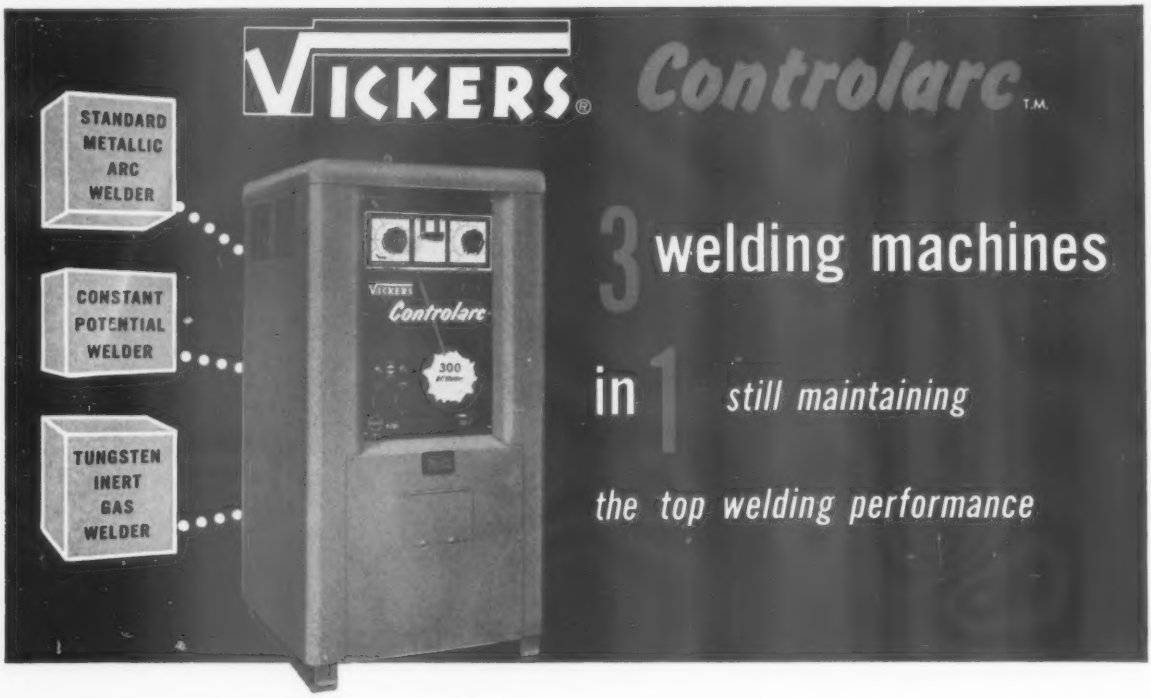

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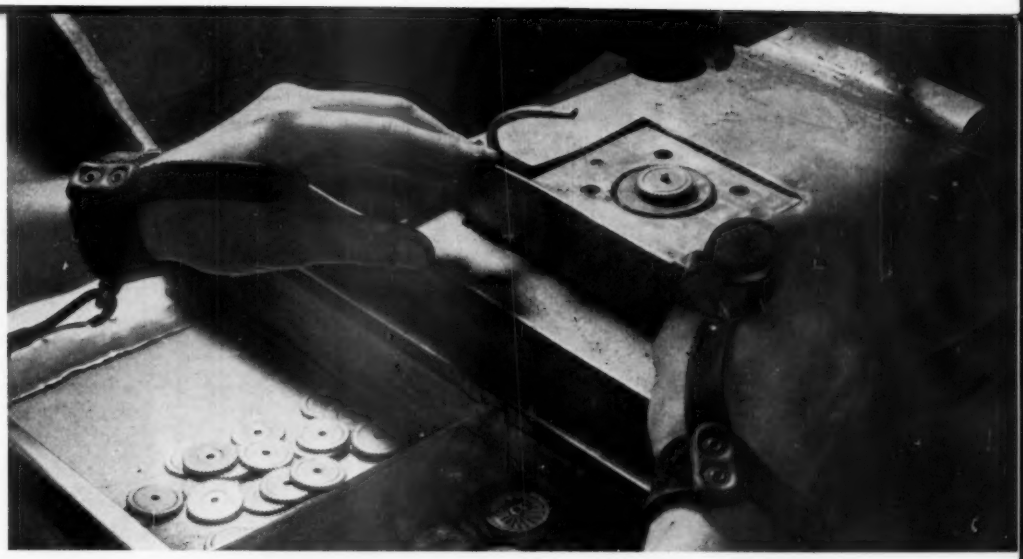


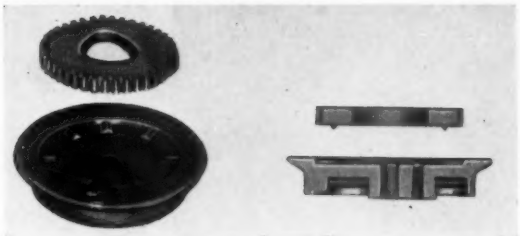


FIGURE 1: Operator positions wheel-to-gear for projection welding.

FIGURE 2: Two views show how toy train gear and wheel are designed for projection welding.

Projection Welding Of Powdered Metal Parts Cuts Costs

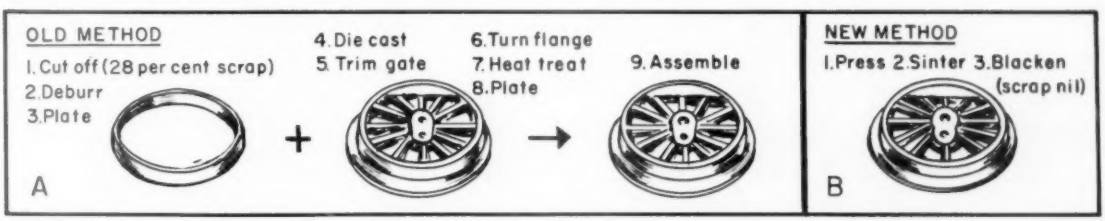
IN BRIEF: Powdered metallurgy and projection welding makes possible low cost, high volume production of toy train locomotive wheels.

PROJECTION WELDING and powder metallurgy go together in reducing costs. That's what design and production engineers found out at the Lionel Corp., Irvington, N.J. They make model trains.

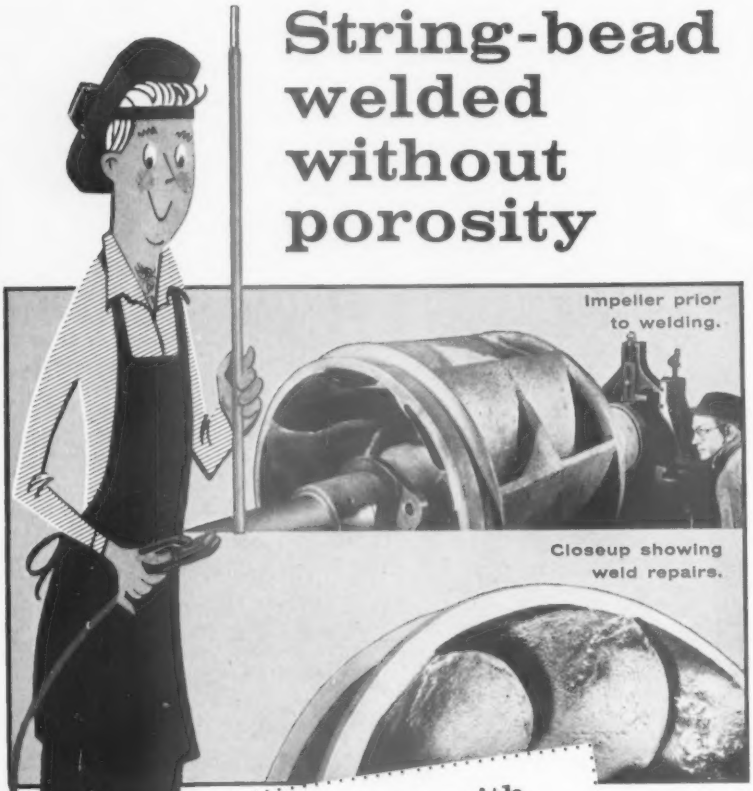
Figure 1 gives a bird's-eye view of how Lionel projection welds their sintered metal locomotive wheels in production. Note use of wrist bands to protect operator's hands. The bands are vital because of die clearance and short ram cycle stroke. Also Lionel has set this operation up so the operator uses both right and left hands efficiently. With the left hand the operator loads and positions gear to bottom die with circular projection upward. With the right hand he places the mating part to the gear. He presses the foot pedal and completes the weld. On the up stroke of the welder an air blast blows the wheel onto a conveyor.

Figure 2 shows how Lionel designed the sintered metal wheel for projection welding. This

FIGURE 3: Smart engineering cuts out six operations, reduces scrap 10 percent.



String-bead welded without porosity



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is not easy to make in one piece. You can see from the picture that a flange in the middle of the piece in addition to the gear on one face and complex surface detail on the other, required interim die castings tools, high costs, added operations.

Figure 3 shows neat examples of cost reduction using sintered metals. New method shows what smart engineering can do. Lionel was able to cut out 6 operations and save 10% scrap.

Welding details: They use a 100KVA press-type welder with fully synchronized controls. The head is air-operated, uses a 40-pound air input. The head gives the low friction and fast follow-up projection welding needs. Dies are water cooled and are made of Class III copper.

Control panel settings: Weld cycle 60; hold cycle 20; squeeze cycle 42; heat cycle 12; and cool cycle 5.

Inspection and testing: Projection welded wheels are periodically inspected as they come off the line. Moreover, Lionel makes stiff process tests. One test is the fastening of the gear and wheel. To insure good welds Lionel peels the wheel and gear apart. To pass, 80% of the projection must pull parent metal. The other test is visual. Both the mating surfaces must be forged together and show no light between them. • •

66-TIP SPOT WELDER

continued from page 46

low) with successive groups firing in rapid succession. Each panel joint (including rails and liners) takes under 30 seconds to weld. Then the table indexes to the next joint. (If the side panel design is the same end-to-end, the machine can be set to weld - and - index automatically, until the side panel is complete).

Series connected electrodes for panel overlap welds (two thicknesses of 22 gauge) are arranged in a double row across the machine. After firing once, they shift sideways to make intermediate welds, so that weld centers are three inches apart.

At the ends and rear of the

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crosswise row are double rows of electrodes (12) arranged normal to table travel. These electrode groups join rails, panel sections and liners, then shift out of the way for the intermediate welding mentioned above.

All welding electrodes are made of RWMA Class III alloy, a good conducting, but deformation resisting, material.

Bottom electrode bars are insulated from the table, therefore, from the rest of the machine. Thus, return electrodes are necessary machine components—to provide current-return paths. The point of contact for these electrodes is heavy copper braid, which makes good electrical contact with the bottom electrode bars.

Transformers for the welder are rated at 50 and 75 KVA. Two master combination electronic sequence controls mounted on top of the machine, control all machine functions. These controls can be set, if a repair weld is necessary, to fire a single electrode.

In practice, this is not done. After a side panel is completely welded, an inspector tests a number of welds with a hammer and chisel. This is non-destructive unless welds are weak. If there are weak welds, they are re-welded with a portable poke welder — until all joints are equally strong.

Tip pressure is applied hydaulically — to between 900 to 1000 psi per electrode. Pressure is verified by means of direct-reading gauges.

On a welder of this size, maintenance might appear to be a formidable job; actually it isn't.

Constant operator vigilance, both as to electrode condition and chisel test results, determines when electrodes need changing. And regularly every two weeks, maintenance people check both electrical and mechanical components of the welder to keep it in top operating condition. • •

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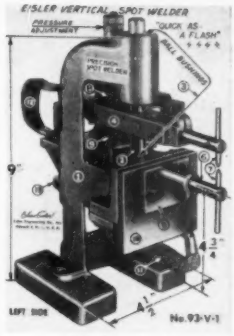

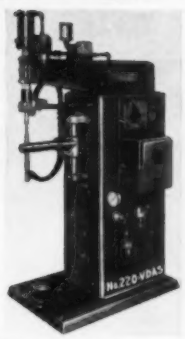

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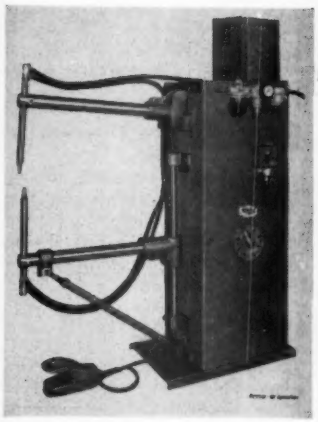

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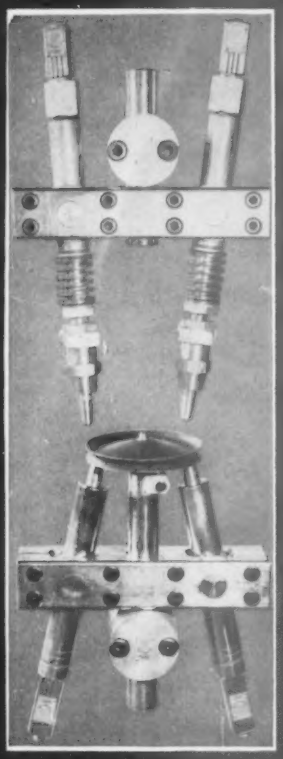

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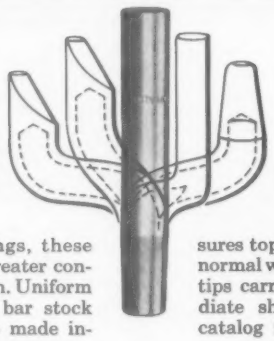

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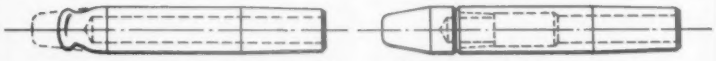

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Tuffaloy resistance welding alloy products are widely available through Airco and Tuffaloy representatives. Call on them for SPOTWELDING TIPS (Standard, 'Tuffcap', Cold-Bent, and Special), Holders and Adapters, BAR STOCK, FORGINGS, SEAM WELDING WHEELS, and all other welding alloy needs. Ask for Catalog and Price List.

AIRCO®

AIR REDUCTION SALES COMPANY

A Division of Air Reduction Co., Inc.

150 East 42nd Street, New York 17, N.Y.

For More Information Circle No. 75 on Reader Service Card.

SPOT WELDING ALUMINUM

continued from page 47

treatment renders the metal perfectly clean, ideal for welding.

Welding must be done within 24 hours of cleaning, or the procedure repeated. (Some alloys can't go more than 12 hours). The reason: The refractory oxides that build up on the aluminum can produce erratic welding. During assembly and welding, operators handle hoods with clean canvas gloves.

Electrodes used for hood welding are made of highly conductive RWMA Class I alloy. A 3-inch radius nose on the electrodes is maintained with a contouring paddle and emery cloth.

Weld quality, as determined by peel and tensile-shear tests, is almost a religion at Spotweld. Though many jobs must be welded to military specs, it is company policy to meet minimum military requirements on commercial work too.

The grinder hood is an example. Every two hours the job is running three tensile-shear tests are pulled.

Test coupons consist of 1 x 4-inch strips of hood material, overlapped 1 inch. A single spot, made on production settings, must pull 570 lb. to pass. • •

COMING EVENTS

September 28-October 1: American Welding Society Fall Meeting, Sheraton-Cadillac Hotel, Detroit.

November 2-6: 41st National Metal Exposition and Congress, International Amphitheatre, Chicago.

May 9-10, 1960: Annual Convention, International Acetylene Association, Hotel St. Francis, San Francisco.

June 21-26: Annual Meeting, American Society for Testing Materials, Atlantic City.

Ryerson Sells Reynolds Aluminum At Los Angeles

LOS ANGELES, CALIFORNIA: Complete service on Reynolds aluminum, in addition to its service on steel, is being given to metal consumers in the Southern California area by Joseph T. Ryerson & Son, Inc., Los Angeles.

zines is $.50 per copy.

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RESISTANCE WELDING ALLOYS

continued from page 45

The Class 4 alloy is available in the annealed condition in which state it can be more readily machined and may be subsequently heat treated to maximum hardness.

Class 5 alloy is a copper-base alloy available principally in the form of castings having high mechanical strength and moderate electrical conductivity.

This alloy is recommended mainly as a high strength and low cost backing material for other resistance welding electrode materials, flash welding dies, and as high strength current-carrying structural members of resistance welding equipment, such as secondary circuit welder arms, knees, platens, etc.

It may be used as structural or current-carrying members in resistance welding fixtures where high strength, wear resistance and non-magnetic properties are needed.

Copper-Tungsten Alloys

These electrode materials are mixtures of copper and tungsten made by powder metallurgy processes. Since they are not true alloys, as those in Group A. they do not respond to heat treatment; nor can they be cold-worked. Their mechanical properties and conductivity are a function of the percent of copper and tungsten employed, hence are not reduced by the heat of welding.

These alloys are not generally used for spot or seam welding because of their low conductivity. However, they are useful where the base material being welded has high resistance (stainless steels or Inconel) or where a heat balance is necessary.

This group is divided into Classes 10, 11, 12 and 13. These have ascending orders of hardness and descending orders of conductivity.

Class 10 material is recommended as facings or inserts for projection welding electrodes and flash and butt welding dies where high electrical conductivity is desirable and a degree of malleability is necessary.

continued on page 56

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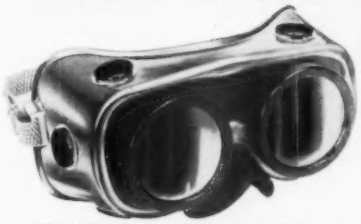
LENDALE OPTICAL CO., INC.
VALLEY STREAM, L.I., N.Y.

WELDER'S and CHIPPER'S "SOFTIE" COVERALL GOGGLES

Type GW-400 welder's goggles



NOTE: Specify lens shade when ordering.

These highly popular, soft vinyl plastic goggles are a top favorite with welders because they offer superior protection and outstanding comfort. They mold the face contour "like a second skin" and are so light they cut wearing fatigue and strain. Fit with ease over prescription glasses. The improved goggles have removable rings and lenses.

GW-400 welder's goggles have lightproof ventilators that eliminate harmful light rays and fogging and famous Glenweld filter lenses.

GC-400 chipper's goggles have direct ventilation and clear frame. They are fitted with Glenrock 50 M/M clear, safety-hardened or laminated lenses.

Type GC-400 chipper's goggles

NOTE: Specify lens type when ordering.

Catalog No. 580 describes Glendale's complete line of industrial safety products. Write for yours . . . Today

GENERAL OFFICES & PLANT
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600 WEST MERRICK ROAD
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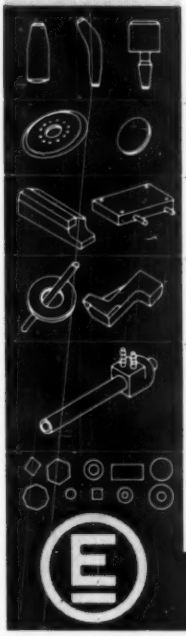
Serving the resistance welding industry exclusively since 1933

ELECTROLOY

ALLOYS IN ALL R.W.A.A. CLASSIFICATIONS



SPOT WELDING TIPS are available as tapered, threaded, faced, flat straight and offset electrodes and as gun welder, straight, swivel and button electrodes.

SEAM WELDING WHEELS are made to give maximum service. They are supplied as machined blanks or to customer specifications.

DIES and FIXTURES are available for flash, butt and projection welding. They are made from parts drawings or from customer's sample of parts to be made.

FORGINGS and CASTINGS are made in all sizes and shapes. Forgings have maximum uniformity and hardness; castings are clean, high quality and free from porosity.

WATER-COOLED HOLDERS are heavy-duty, watercooled ejector and non-ejector types for use with tapered or threaded tips.

RODS and BARS are supplied from stock in all RWAA classifications for fabrication into electrodes; available in all diameters, rectangular and hexagonal shapes in mill lengths or cut to size.

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YOUR Resistance Welding Electrode NEEDS are OUR Business!

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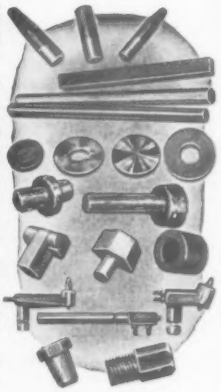
TIPS:
ROD or BAR:
SEAM WELDING WHEELS:
FORGINGS:
CASTINGS:
HOLDERS:
ADAPTERS:



SPECIAL WELDING DIES or FIXTURES: TIPALOY *has them.*

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TIPALOY can supply you with:
RWMA Class #1, Tipaloy #100
RWMA Class #2, Tipaloy #130*
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and other RWMA classes of alloys to fit your needs.
It is unwise to pay too much, but it is worse to pay too little!

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RESISTANCE WELDING ALLOYS *continued from page 55*

Class 11 (a harder material than Class 10) is recommended as facings and inserts for flash and butt welding dies and general purpose projection welding electrodes. It may also be used as seam welder bearing inserts and facings for electro-forming or electro-forging dies. It is recommended for spot welding of steels having high resistance, such as stainless steel.

Class 12 material is specifically recommended for heavy-duty projection welding electrodes and for die facings in electro-forming and electro-forging applications. It is suitable as die material for electrical upsetting of rivets and studs.

Class 13 material is recommended principally for welding or electro-brazing non-ferrous metals having relatively high electrical conductivity.

Cross wire welding of copper and brass wires and welding of copper wire braid to brass and bronze terminals are typical applications. Generally, special setups and procedures are required for this type of work. • •

Kaiser Aluminum Shifts Sales Offices

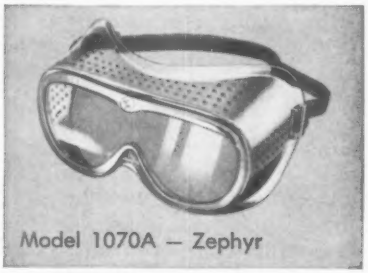
CHICAGO, ILLINOIS: Kaiser Aluminum & Chemical Corp. has announced plans to move its general sales offices from Chicago to next few months.

Sperry Sponsors Ultrasonics School

DANBURY, CONN.: Representatives of many of the nation's largest corporations attended a special ultrasonic inspection school held here recently by Sperry Products, Inc. The basic theory of ultrasonics and principles of its inspection application were presented in classroom lectures supplemented by discussion periods. Actual practice in equipment operation was supplied by several laboratory sessions.

THE *NEW* VIEW FOR WELDERS!

WELSH sets the pace in creative design . . . new modern materials and techniques for your more effective eye protection.



Model 1070A — Zephyr

WELSH ZEPHYR — New, increased working visibility . . . greater top ventilation! The first major improvement since the origin of the soft-side. Choice of five ventilation styles.

Model 5070 — Cyclops

WELSH CYCLOPS — A one piece aperture welding goggle . . . soft side frame provides the ultimate in comfort, fit and visibility. Simplified lens holder permits easier changing of filter and cover plates.

Model 5050 — Soft-I

WELSH SOFT-I — Cushion-fit eye protection featuring unique, soft, pliable frame cover goggles. Deep cuts fit easily over largest prescription goggles.

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WELSH
MANUFACTURING COMPANY
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RESISTANCE WELDING CONTROLS

continued from page 42

steps, current adjustment for 440 volt is 20 to 80%; for 220 volt 40 to 100%. (2) *Taps on an auto transformer.* For series parallel 8-steps current adjustment you can get 40 to 100%; for 16 steps you get approximately 25 to 30% adjustment. (3) *Electronic phase shift control.* You get for 440 volt 15 to 100% current adjustment; for 220 volt you get 40 to 100%.

The electronic method controls the rms voltage applied to the primary of the welding transformer, which in turn, controls the secondary, or output, voltage.

The range of current control with this method depends upon the voltage of the power supply and the type of tubes in use. If you use thyratrons to conduct the welding transformer primary current, you can completely control from the normal or 100% current to practically zero for all standard power supply voltages.

Ignitrons on the other hand, require certain minimum voltage and current to start the ionization process. For this reason you could get complete control from 100% to zero. You have to limit the minimum value to 40% rms current for 220-volt, and 20% rms current for 440 volt or higher.

Preheat and Postheat Controls. *A preheat control* is an additional element to provide a preheating current and time interval between the squeeze time and weld time or weld interval. The current and time values are controlled independently of the welding current and time.

A *postheat control* is similar to the preheat control except that it is interposed between the weld time and hold time. This control is used as a means of heat treating or tempering welds in hardenable steels and to permit slow cooling during the forging cycle, often desirable for certain alloys. You need chill (quench) time interval immediately following the weld time or interval when tempering welds in hardenable steels. This permits the weld zone to cool. This chill time is undesirable when postheating during the forging cycle, because you have to apply the forging force before the weld zone has cooled appreciably.

Slope control is used with either nonsynchronous or synchronous precision single-phase spot welding controls, which include electronic heat control. *Slope up* control permits a gradual increase in welding current to full welding current. *Slope down* control permits a gradual decrease in the welding current after completion of the nugget formation.

The slope control in effect is an electronic resistor whose value varies with time. When the squeeze time in the standard sequence timer times out (terminates), the slope control is energized for slope up control. During the weld time or weld intervals, the slope control is energized for slope down control. The slope control starts to energize the electronic timing circuit,

continued on page 58

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RESULTS

Reason why — it Pays to Specify
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Profitable, rejection-free brazing results depend upon alloy uniformity. That's why United scientifically controls this vital factor through the modern miracle of spectographic analysis, the most positive alloy check ever developed! Another reason why it pays to specify United Sil-Bond and Phoson silver brazing alloys. Available in coils, straight lengths and pre-formed rings through your welding supply wholesaler or direct from:

United Wire and Supply Corporation
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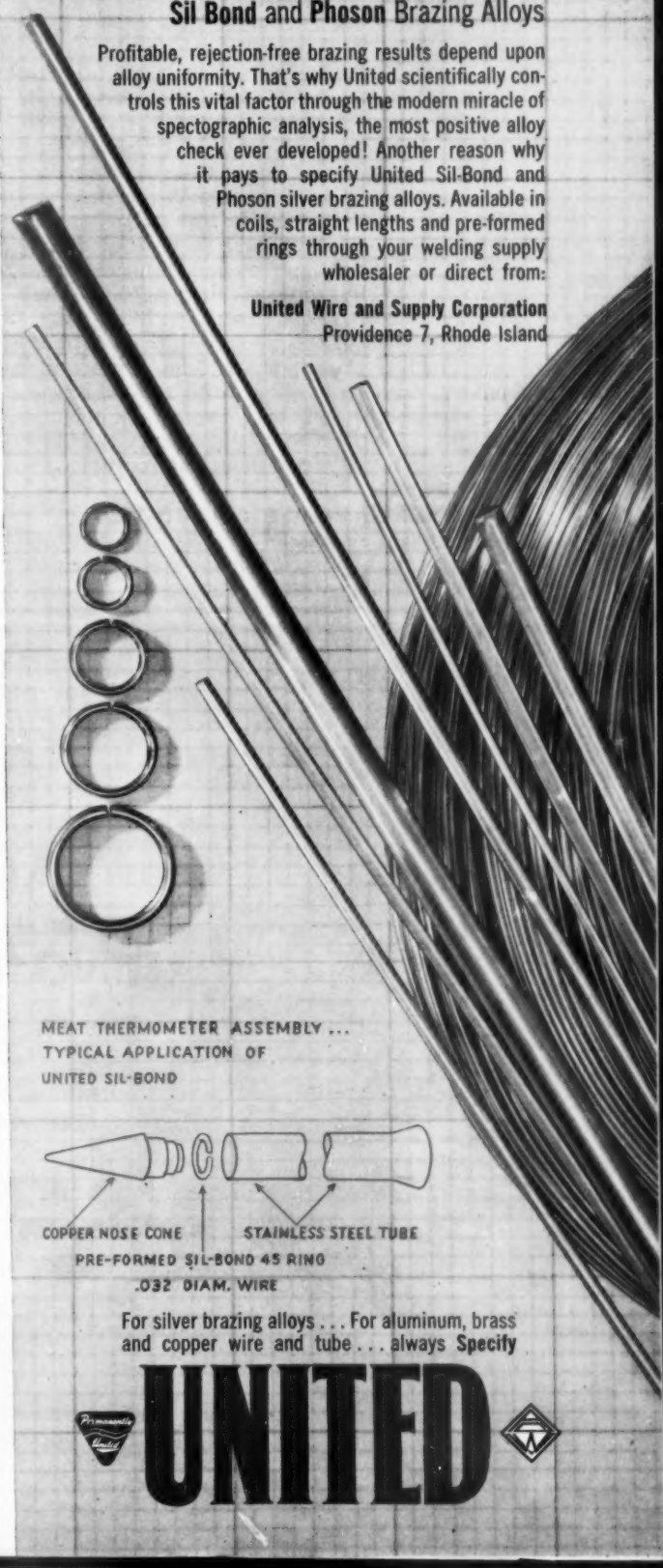

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TYPICAL APPLICATION OF
UNITED SIL-BOND

For silver brazing alloys . . . For aluminum, brass and copper wire and tube . . . always Specify

UNITED

RESISTANCE WELDING CONTROLS

continued from page 57

which causes an electronic resistor to increase or decrease in value. This gradually advances or retards the phase of the heat control in the standard panel.

Program Welding Timers. These special timers not only cause the current to flow with a variable timing pattern, but also take advantage of the fact that the current magnitude may be changed by means of electronic tubes with phase control. Some program timers have three timing intervals: a preheat time, a normal weld time, and a heat-treat (or post-heat) time. Besides the three time adjustments the program timers may have a total of three heat adjustments if electronic tubes are used. A modification of this type of timer is one in which there is an adjustable chill interval between the normal weld and the post-heat timer.

A further modification of the program timer is one in which the current is changed gradually from one value to another over a definite length of time. A control of this sort may also include more than one time interval and more than one cool interval with or without the multiple-impulse feature.

THREE PHASE CONTROLS

Synchronous Commercial are 3-phase controls that can weld highly conductive metals such as aluminum and magnesium. This control can also weld low conductive metals such as alloy steels, stainless steels and nickel base alloys.

If you have a sequence control with Squeeze, Weld Interval, Heat (Syn.), Cool (Syn), Phase Shift Heat control, Hold and Off Timers you'll be able to weld both high and low conductive metals.

To weld air hardenable steels with this control you add these functions—Preheat, Quench and Postheat.

Synchronous R-C Circuits are controls used for general aircraft, airframe and military fabrication.

Standard control functions include: Squeeze, Weld Interval, Heat (Syn.), Cool (Syn.), Current Decay (Syn.), Recompression Delay, Hold and Off Timers. Additional functions such as variable pressure, precompression and phase-shift heat have been added to the control to give it added flexibility. To weld air hardenable steels you can add easily Preheat, Quench and Postheat functions. These additional functions make it possible with this control to get the accuracy you need to produce repeatedly metallurgically sound welds.

Dekatron Counting Tube is used in spot welding aluminum, magnesium alloys, low carbon, stainless steels, air hardenable steels, nickel alloys and titanium. This control is designed to meet quality requirements of military specifications for jet engines, missile and AEC projects that

TISCO®
TIMANG®
MANGANESE-NICKEL STEEL
WELDING PRODUCTS
Timang Manganese Welding Rod fuses easily and does not weaken the parent metal. Weld has the same work hardenability and wear characteristics as Manganese Steel. Rods, Bars, Plates, Etc. are excellent for repairs and new installations.
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For More Information Circle No. 69 on Reader Service Card.

require long weld sequencing with repetitive accuracy.

The Dekatron tube counts cycles of line frequency, and has absolute command of all welder sequence functions, and does not deviate from its settings. Set-up to repeat previous production run is simple and positive.

THREE PHASE MACHINES:

The superiority of the 3-phase system over older systems lies in its better electrical load characteristics and its ability to produce quality welds in the widest range of materials.

The 3-phase system is a more desirable electrical load, because its demand is equally distributed at high power factor over all three phases. This contrasts with lower power factor unbalanced load characteristics of single-phase machines. Moreover, for a given welding application the KVA demand and the primary demand for 3-phase machine may be ½ and 1/3 respectively that required by a single phase machine.

Several common 3-phase machines are:

Frequency Converter: This machine has a special welding transformer with a 3-phase primary and single-phase secondary. The current in the primary windings is controlled by ignitron tubes. First one phase or winding of the transformer is active, then another, then the third, then the first again, etc. This delivers to the

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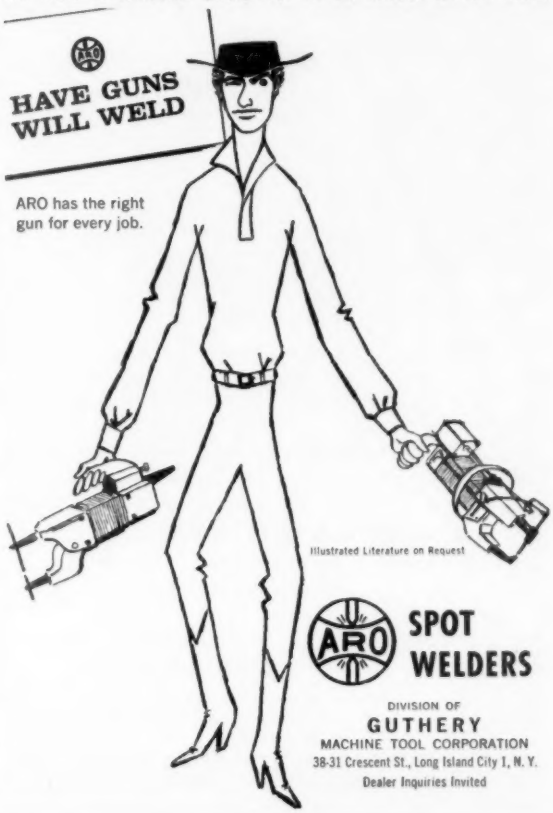

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EXTRA POWER! EXTRA FEATURES! EXTRA PERFORMANCE!
NO BRUSHES! NO COMMUTATOR! NO ROTOR WINDING!
SPECIAL . . . FREE THREE DAY TRIAL ON ANY GASTON POWER TOOL—Disc Grinders, Edge Grinders, Direct Drive Edge Grinders, Right Angle Grinders and Aluminum or Stainless Steel Polishers . . . All in your voltage requirement. (3-phase, 60 Cycle)
A completely sealed motor—This and our many other exclusive features practically eliminate "down-time" due to service difficulties.
It's true . . . for faster, more economical production grinding or polishing . . . comparative tests prove conclusively that Gaston Grinders and Polishers do the job quicker—up to 60% faster than many others.
Initial cost, operation and maintenance run more than 50% below costs of comparable tools of the same horsepower rating.
Sales representatives in all markets to assist you in selecting the proper tool for your particular needs.
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Look — at these sheared tubular ends — clean, true contoured and close fitting with a minimum of burr and distortion . . . *You can make them fast,* some up to

2000 an hour with Vogel patented tools. Or, if you prefer, we can do your notching, shaping, shearing and perforating . . . Either way

You save on cost!

ARC-FIT® notches up to 720 per hour.

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VOGEL TOOL & DIE CORPORATION

1819 N. 32nd Ave., Stone Park, Ill.

RESISTANCE WELDING CONTROLS

continued from page 59

secondary winding a single-phase current of low frequency (usually 5 to 20 cycles). This low frequency secondary current increases the power factor, which in turn, reduces the demand from the power lines. This type of machine can be used for seam, spot, multiple-impulse and some flash-welding applications.

Metallic Rectifier: This machine has a special welding transformer with 3-phase primary and secondary windings to reduce the power supply voltage to the lower welding voltage. The current from the 3-phase secondary windings is converted to single-phase unidirectional current by means of a metallic rectifier. This makes it possible to produce a 3-phase demand, lower per phase, than that of the conventional single-phase machine. This rectifier machine can be used for seam, spot, and multiple-impulse welding applications. The rectifier stacks are compact and are capable of standing heavy current overloads.

LEASING

continued from page 39

Q: *Do leasing agreements contain purchase options?*

A: Yes, leasing agreements can contain purchase options. However, Nationwide Leasing

What about

welding wire

for that special steel alloy?

Try Johnston & Funk for fast, flexible service and certified quality. Wire like this: "Vacutrode"* melted, single or double; low gas content; specially controlled chemistry; low phosphorous and sulphur; additions of reactive metals, such as Ti, Zr; special finish; extremely low non-metallic inclusion content. Spooled, coiled, or straightened and cut. Packaged in polyethylene in Argon atmosphere. R & D or production quantities.

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*Consumable electrode vacuum melted

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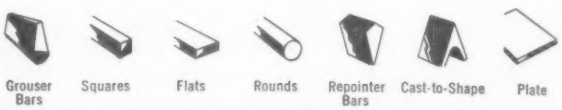

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Company advises against including purchase options in the leasing agreement. The reason is that a purchase option generally converts a leasing agreement into a conditional sales contract, in the eyes of the Internal Revenue Department.

Q: *Do leasing contracts contain renewal options?*

A: Yes, of course. In leasing, the cost of the equipment is paid for entirely in the original leasing term. Renewal options are usually available at extremely low cost. They can range in length from one-year options to indefinite terms.

Q: *Does leasing offer companies tax advantages?*

A: This has been an area of much misinformation. Leasing is not a method of tax avoidance; its primary value lies in the way it frees working capital for other uses. In certain specific situations leasing may also offer companies advantages of tax-timing which is not to be ignored. Leasing charges are legitimately deductible as business expenses. As such, they reduce taxable income *now*.

Leasing may also offer a tax advantage that can be of particular importance to companies which find that their equipment tends to become obsolete much more quickly than government depreciation tables permit. For example, a company using equipment that must be replaced in seven years, may find that depreciation tables permit depreciation only over 15 years. By leasing this equipment for a seven-year period, this company would be able to deduct the full cost of the equipment from taxable income in seven years.

In certain sale-leaseback situations also, tax advantages may accrue, since the sale of an asset normally involves taxation at the capital gains rate, if a profit is made, rather than at the corporate rate. • •

WELDING CHROME-MOLY

continued from page 31

hot. The operator works almost in a ring of fire. All operators on the job were certified.

After welding, the work is stress relieved at temperatures of 1100 to 1250°F. Then the weldment is machined.

Warpage and shrinkage was controlled to within $\frac{1}{16}$-inch. • •

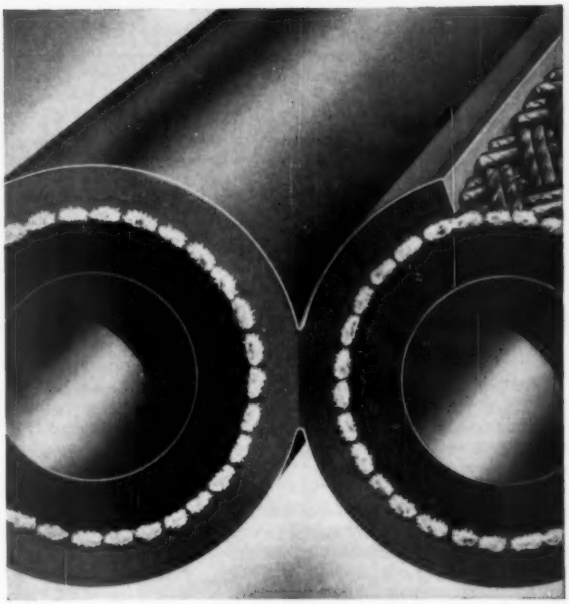
WELDING VS. CASTING

continued from page 32

This requires much less space than castings.

7. Time: Welded construction allows better overall control over the entire manufacturing process. With castings some of this control is dependent upon the delivery of castings from the foundry.

8. Appearance: The welded product is cleaner and is more readily adaptable to attractive structural design. • •



TWIN-WELD . . .
THE
NON-KINKING
HOSE!

Because it's molded in *straight* sections by the exclusive Hewitt-Robins platen press process, Twin-Weld hose eliminates troublesome kinking and curling. Thus it's safer, neater, easier handling.

Twin-Weld gives these extra advantages, too:

NON-POROUS. Increases welding efficiency . . . promotes safety.

NON-SNARLING. Continuously joined . . . yet easily separable if desired.

LONGER LASTING. Flame-resistant neoprene cover adds greatly to service life.

Twin-Weld is preferred by the great majority of experienced welders. For further information or service, consult your local H-R representative, or write Hewitt-Robins, Stamford, Connecticut. Ask for Bulletin 6-44.

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An INDUSTRY & WELDING REPORT . . .

New Products Highlight American Welding

THE LARGEST DISPLAY of welding equipment and accessories ever assembled is the best way to describe the American Welding Society's annual Spring Welding Show held in Chicago's International Amphitheatre recently. INDUSTRY & WELDING editors contacted as many exhibitors as possible to see what new products were being introduced. Some of them are described here.

Because of space limitations we are unable to describe every new product featured at the Show. However, all new products introduced will be featured in INDUSTRY & WELDING's New Products Sections during the next few months. The first group will be found in this issue starting on page 72.

ARC WELDING EQUIPMENT seemed to dominate the show. Featured were new machines, automatic and semi-automatic equipment and processes, controls, positioning equipment, electrodes and wires and accessories.

Arc welders introduced ranged in size from Miller Electric Mfg. Company's SR-1000-A1, a three-phase DC transformer welder that supplies 1000 amperes at 40 volts on a 100 percent duty cycle basis, to Emerson Electric's redesigned 195-amp portable AC welder that weighs only 66 pounds, operates off 220 or 440 lines and uses $\frac{5}{32}$ and $\frac{3}{16}$-inch electrodes.

Lincoln Electric Co. unveiled its new Idealarc "Tig" AC and AC/DC machines. Available in NEMA-rated 300 amp size, welder can be used for all manual arc welding applications: AC inert gas and manual electrode and DC inert gas and manual electrode. Its features are high frequency and remote control.

Contributed by Hobart Bros. Company was a combination 300 amp AC/DC water-cooled, gas-driven welder with 10KW of 110/200 AC power and Tigpak, a portable package for tungsten inert arc welding in the field or at a distance from the welding machine.

A constant potential machine for automatic and semi-automatic gas shielded welding of thin-gauge ferrous and nonferrous metals was featured by Westinghouse Electric. The company's "RCV" power source features a built-in dynamic reactor, a single phase system, choice of arc action and overload protection.

Mid-States Welder Mfg. Co. introduced its Magna-Tran welder line. Basically a single phase AC transformer welder, machine can be easily converted into an AC/DC or an AC/DC inert arc welder—either in the field or at the factory.

Automatic welding systems were highlighted by Amalgamated Industrial Corporation's European-developed "Electroslag Process." The "Vertomatic" machine developed for this process butt welds plates from one-inch thick and up in a single pass in the vertical position. Key is fusion of parent metal and continuously fed weld metal under a substantial layer of high temperature electrical-conducting molten slag.

An automatic flux circulating system was featured by Sight Feed Generator Co. In the company's new Rexarc system there is no manual handling of flux in keeping hoppers filled; the operator only empties a bag of flux periodically onto the vibrating screen.

Arcos Corporation's new automatic girth welding system uses the company's Arcosarc process (visible arc CO_2 shielded automatic process with flux-cored wire) for field erection of mild steel storage tanks.

A new automatic bulk Borium hard-facing process was the feature at Stoody Company's exhibit.

Metal & Thermit Corp. introduced its Murematic wire feed, a versatile unit for both automatic and semi-automatic welding using wires from .020- to ¼-inch for open arc, submerged arc or CO_2 gas shielded arc welding.

Semi-automatic equipment featured at the show included Air Reduction's dip transfer CO_2 welding (see illustration) in which metal is transferred entirely by a wiping action at the time of short circuit, rather than being projected through an arc stream. Airco's H. D. Mann, product sales manager, explained that this process will give lasting benefits to "fabricators in every area where the economical welding of mild and low alloy steels in all positions has posed particular problems in the past."

A. O. Smith Corporation's "button welding" attachment for its CP C-O Manual welding package is designed for low-cost joining of steel from .035- to .187-inches and is intended to replace or augment conventional resistance spot welding and/or riveting. The CO_2 gas shielded process has a consumable electrode which adds filler metal to the weld and makes finished welds resembling a rivet or button head.

Sigma short arc welding is a

AIR REDUCTION'S dip transfer CO^2 welding process is intended for economical welding of mild and low alloy steels.

HARNISCHFEGER introduced equipment for punched tape control of welding programs (left) and a motorized rheostat (right).

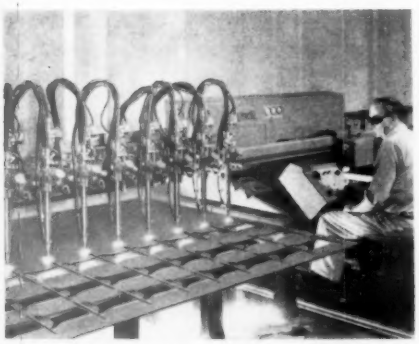
Society Show

Linde-developed method for welding thin material, including carbon and stainless steels and aluminum, at high speeds. It transfers metal by droplet rather than spray-type transfer. Technique depends on four factors: suitable power supply (constant potential with drooping characteristics); shorter than usual arc; small wire feeding mechanism and proper shielding gas.

Dynaweld is the name given to a portable, semi-automatic welding system introduced by Reid-Avery Co., Inc. A precision-stranded, coated filler wire which is essentially a "continuous coated mild steel electrode" (comparable to E6012 or E6020) is the heart of the system which is completely independent of water cooling and gas shielding. Unit consists of a welding gun, welding wire and wire-feeding system. Power is furnished by any AC or DC (preferred) welder.

Arc welding controls were headlined by Harnischfeger Corporation which introduced equipment for punched tape control of welding programs and a motorized rheostat (see illustrations). The former programs a weld by controlling the time and magnitude of welding; this is done by using a punched tape and reader device incorporating control relays and resistors which are switched in combinations as set up on the tape. The latter is used for automatic inert gas welding of special metals in which rate of change in welding current through fusion point is important in eliminating thermal shock at the beginning of the weld and cracking at the finish of the weld.

A control introduced by Tec Torch Co., Inc., is a light, compact, portable unit which operates on 110 volts. It makes possible the use of any DC power source for Tig spot welding.



LINDE'S shape cutting machine has an electronic tracing system that automatically compensates for kerf width.

Other controls and recording devices: Square D Company, a proximity positioning control for controlling the level of manipulator booms to maintain ideal arc length; Arcair Company, an arc time recorder; and Cecil C. Peck Company, a direct reading gauge which gives welding speeds in inches per minute when timed by a stop watch.

Positioning equipment was displayed prominently.

Worthington Corporation featured a 12-by-12 welding head manipulator with electronic drive, adjustable roller clusters and newly designed saddle spread which minimizes deflection.

An "Economy" series of medium turning rolls was presented by Webb Corporation.

Aronson Machine Company introduced a 2-ton capacity version of its universal balance welding positioner and displayed a geared-elevation welding positioner.

Latest models of "Universal" welding head manipulators and automatic seam tracing controls were the center of interest at the Lewis Welding & Engineering Corp. exhibit.

Pandjiris Weldment Company featured a welding head manipulator with electronic devices for remotely-controlled movements.

Electrodes and welding wires for all processes and all metal were shown:

A low-hydrogen AC/DC nickel-manganese electrode introduced by All-State Welding Alloys Co., Inc., is recommended for joining and wear-surfacing austenitic manganese and carbon steels. Intended to replace stainless steel, the company's HS-4, AC/DC is said to deposit weld metal that equals that of stainless (Type 307) electrodes.

Semi-automatic open arc wires for high strength welds on manganese and carbon steels and for deformation-resistant build-up applications were shown by Alloy Rods Co. The company's Wear-O-Matic WH fabricated wire gives a high strength welding alloy and a work-hardening wear-resistant alloy. Fully austenitic deposits result in tough, crack-resistant welds.

International Nickel's filler wires, including Inco-Weld "A", 70/30 copper-nickel, Inconel, Monel and nickel, are now available on handy, new 2-pound Mig spools.

Page Steel and Wire Division, American Chain & Cable Co., Inc., introduced its new A-S-18 welding wire, which is designed for CO_2 welding with suitable deoxidizers to scavenge the weld metal of all impurities and residual gases. When used in submerged arc welding with neutral or slightly manganese-additive flux, wire give tensiles of 114,000 to 120,000 psi and elongation of 20 to 25 percent.

Arc welding accessories were highlighted by a new, cool-running, easy-to-attach threaded power connection system developed by Lenco, Inc., for connecting welding cable.

A new line of high-impact, plastic-insulated panel board receptacles and plugs was shown at the booth of Cam-Lok Division of Empire Products, Inc.

RESISTANCE WELDING EQUIPMENT displayed was varied in nature and included controls, welding machines and cable.

General Electric's Electronic Components Division introduced a new Size E ignitron tube for high current applications. The GL-7151 is a sealed, water-cooled ignitron with a stainless steel jacket for AC control service. In such applications two tubes in an inverse-parallel connection with control 4800 kilovolt-amperes at voltages of 250 to 500 volts over a frequency range of 25 to 60 cycles. Maximum demand current below 500 volts is 9600 amperes RMS. Ignitron features a mounting bracket for a detachable thermostat.

Another resistance welding control featured by Robotron Corp. is a new four-function precision welding timer which is said to provide absolute accuracy to plus or minus zero percent.

Resistance welding machines were unveiled by Alphil Spot Welder Corp. and Vacuum Tube Products Co., Inc. The former introduced a rocker arm-type foot-operated spot welder. The latter showed a 2.5 KVA spot and seam welder with 4 secondary outputs.

Uniflex Cable Division, Gar Wood Industries, introduced a "Super-Flex" kickless resistance welding cable for use with portable resistance welding tools. It features longer life, greater flexibility and increased handling ease.

GAS WELDING, CUTTING AND BRAZING equipment and accessories were also in the limelight.

A package-type generator introduced by Independent Engineering Co. produces 2800 standard cubic feet of high purity gas per hour (2000 oxygen and 800 nitrogen) and has a Freon compressor which permits gas to be drawn off in liquid form.

Several new regulators were introduced. Victor Equipment Co. unveiled a new line of high pressure, large volume gas regulators; Smith Welding Equipment Co. displayed a push-button control valve which regulates the flow of oxygen and fuel gas in welding and cutting operations.

continued on page 71

For More Information Circle No. 68 on Reader Service Card.

WORN TRACTOR PARTS
last longer when rebuilt with
MANGANAL®
11¾-13½% MANGANESE-NICKEL STEEL
APPLICATOR BARS &
WELDING ELECTRODES

Sprockets

• Manganal deposits smooth-in to fit opposing parts.
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• Cost less and outlast new parts

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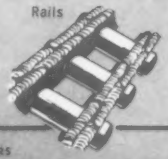
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OUT GO WELDING FUMES

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assures "on-the-spot" efficiency with powerful suction in magnet-base receptor

Newest development by CAR-MON, specialist in carbon monoxide removal for garages and repair shops . . .

Lifetime magnet-base holds exhaust receptor fast on work or nearby metal. No bulky counterbalances needed. Flexible tubing gives full, easy maneuverability. Car-Mon's simple installation thoroughly exhausts gases, smoke and heat . . . gives practical, low-cost air cleaning for any shop layout.

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For More Information Circle No. 21 on Reader Service Card.

EQUIPMENT is demonstrated as . . .

Open House Features Automatic Arc Welding

CLEVELAND, OHIO: Close to 250 users of welding from Ohio and adjacent states recently attended an automatic welding open house sponsored by the C. B. Herrick Mfg. Corp. They saw a series of welding demonstrations featuring automatic welding equipment and accessories manufactured by eight different companies. Represented were Aronson Machine Co., Airline Welding & Engineering, C. B. Herrick Mfg. Corp., Hobart Bros. Co., Invincible Vacuum Cleaner Mfg. Co., Lincoln Electric Co., Linde Company, Division of Union Carbide Corp., and Miller Electric Mfg. Corp.

BALANCE-TYPE POSITIONER is demonstrated by C. B. Herrick.

Fibre-Metal Forms Subsidiary Company

CHESTER, PENNA.: Formation of a new subsidiary company to warehouse wholesale welding accessories and safety equipment in seven Western states has been announced by Charles E. Bowers, Jr., sales manager, Fibre-Metal Products Co.

Fibre-Metal Pacific, Inc., will be located in Bell Gardens, Calif., and will sell exclusively to distributors. The new company will warehouse inventory of Fibre-Metal, Glendale Optical Co. and J. N. Ragle Industries, Inc.

Miller Official Is Granted Patent

APPLETON, WISCONSIN: Miller Electric Mfg. Co., Inc., has announced that U.S. Patent No. 2880374 has been granted to A. C. Mulder, vice president for production. Patent covers an AC-DC arc welding machine in which the welding current is controlled by a self-saturating reactor, selenium rectifiers and an independent D-C control circuit.

Patent rights have been assigned to Miller. Arc welders incorporating this invention are now being produced and marketed.

Duro's New West Coast Factory Distributor

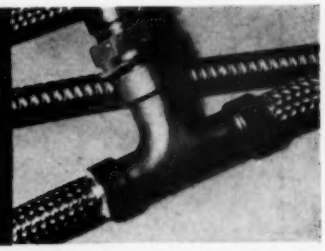
HAMDEN, CONN.: A new West Coast factory distributor has been appointed by Duro Engineering Co., manufacturer of electrode holders. Named to handle a complete stock of Duro holders and parts was Kenco, 10081 Carmen Road, Cupertino, California. K. V. Lutz heads the operation.

Training Center For Automatic Surfacing

WAUKESHA, WISCONSIN: A training center teaching the theory, techniques and methods of hard facing and resurfacing metal parts with automatic welding has been opened here by Automatic Welding Company.

For More Information Circle No. 5 on Reader Service Card.

SOLDERING PROBLEM?
stainless to aluminum?
aluminum to copper?
cast iron to steel?



BOEING 707 Landing Gear Harness
Braided stainless steel wire and flexible conduit had to be joined to cast fittings. Brazing burned the fine wire. ALL-STATE had a special solder which solved the problem. (See #430, below.)

You get high strength with ALL-STATE special solders

#7 Special solder for cast iron 450-600°F. Withstands 1000 psi P.

#37 Developed for joining aluminum with soldering iron at low 450°F. Good color match and corrosion resistance. Also joins dissimilar metals. 1000 psi P.

#39 Special solder to join all types of aluminum for both build-up (450°F) and capillary flow (650°F) – with or without flux. 8000 psi T.

#55 Newly developed aluminum "rubbon"® solder – NO FLUX – 705°F – 20,000 psi T. All aluminums.

#105 Special medium temperature alloy for both ferrous and non-ferrous metals (640-740°F) – to 25,000 psi T.

#107 The finest made to join aluminum to steel, copper and brass – or to each other (480-600°F) – to 25,000 psi T.

#430 NO LEAD, NO ZINC or CADMIUM – develops tensile strengths of 10,000 to 28,000 psi on stainless and dissimilar metals. For soldering iron at a low 430°F.

Send for ALL-STATE Instruction Manual. ®RUBBON is a registered trade name.

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Distributor-Stocked, convenient to buy. Economical to use.
ALL-STATE WELDING ALLOYS CO., INC., White Plains, N. Y.
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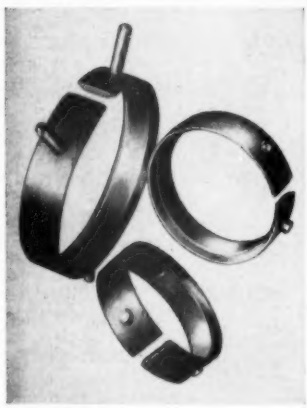

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- Consistent root penetration.
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Available in Carbon Steel, Wrought Iron, Chrome Alloys, Stainless Steel and Aluminum.

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For More Information Circle No. 63 on Reader Service Card.

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ONLY ACOUSTICA ULTRASONIC CLEANERS HAVE MULTIPOWER!

The Multipower transducer developed by Acoustica research, multiplies the power and efficiency of ultrasonic action. Cleaning is faster, better, labor costs are lower. Acoustica ultrasonic cleaners are built for performance and durability. They are engineered to the finest standards, unequaled in quality and value.

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Circle No. 2 on Reader Service Card

REFERENCE DATA

catalogs, handbooks, manuals

TANK PRODUCTION MACHINERY marketed by Webb Corporation is the subject of illustrated literature. Featured are horn-type and assembly fixtures, cylinder flange offsetters, seam welders and unit-type rolls. **For More Information Circle No. 80 on Reader Service Card.**

PIPE NOTCHING TOOL which makes perfect joints for welding or brazing is featured in descriptive literature. How standard Arc-Fit unit in hand or power press shears contours for "T" joints is explained. Tool can be used for ½- to 2-inch tubing with interchangeable dies. Also described are special Arc-Fits for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock. **For More Information Circle No. 79 on Reader Service Card.**

THREE WELDING MACHINES IN ONE is the way Vickers Incorporated, Electric Products Division, described Controlarc welder. Descriptive bulletins 7136-1 and 7146-1 explain how unit can be used for standard arc, constant potential and tungtsen inert gas welding. **Circle No. 77 on Reader Service Card.**

RESISTANCE WELDING ELECTRODES and alloys for every application are featured in comprehensive new catalog offered by Tipaloy, Inc. Featured are tips, rod and bar stock, seam welding wheels, forgings and castings, adapters and holders. Special welding dies and fixtures are covered. **Circle No. 74 on Reader Service Card.**

MANGANESE-NICKEL STEEL WELDING PRODUCTS marketed by Taylor-Wharton Division of Harsco Corp. are the subject of available literature. Described and illustrated are weld rods, plates, bars and special shapes. **For More Information Circle No. 69 on Reader Service Card.**

BACKING RINGS for welding pipe, valves and fitting joints are the subject of a bulletin issued by Robvon Backing Ring Co. Featured is a complete line of rings available in carbon and stainless steels, wrought iron, chrome alloys and aluminum. **For More Information Circle No. 63 on Reader Service Card.**

HOW IRON POWDER ELECTRODES can deposit 17 pounds of metal per hour is explained in a bulletin issued by Metal & Thermit Corp. Bulletin explains how Murex Speedex Triplex modified E6027 electrodes can be more economical than a conventional E6020 electrode even though their initial cost is higher. **Circle No. 54 on Reader Service Card.**

A NEW METHOD OF CONNECTING CABLE is introduced in literature available from Lenco, Inc. Explained is how cool-running, threaded power connection can be made in three easy steps with simple tools. **For More Information Circle No. 49 on Reader Service Card.**

FLEXIBLE SHAFT MACHINES are described and illustrated in a new 8-page catalog No. 59 from Stow Manufacturing Co. These flexible shaft machines with single and multi-speed attachments can grind, sand, polish, buff, sand and drill steel and wood. They are available with truck, bench, and suspension mounting. The catalog also lists a complete line of accessories. **Circle No. 90 on Reader Service Card.**

TWO NEW BULLETINS containing capsule information on the "NCG" line of welding and cutting equipment for maintenance repairs have been prepared by the National Cylinder Gas Division of Chemetron Corp. Four-page bulletin N-112 is available for industrial and commercial building management and maintenance departments; NM-112 is for hospitals and similar establishments to which the division also supplies medical gases and inhalation therapy equipment. **For More Information Circle No. 91 on Reader Service Card.**

FACTS AT YOUR FINGERTIPS: *If you want copies of the catalogs featured on these pages, just circle the appropriate numbers on the bound-in Reader Service Card. We'll do the rest.*

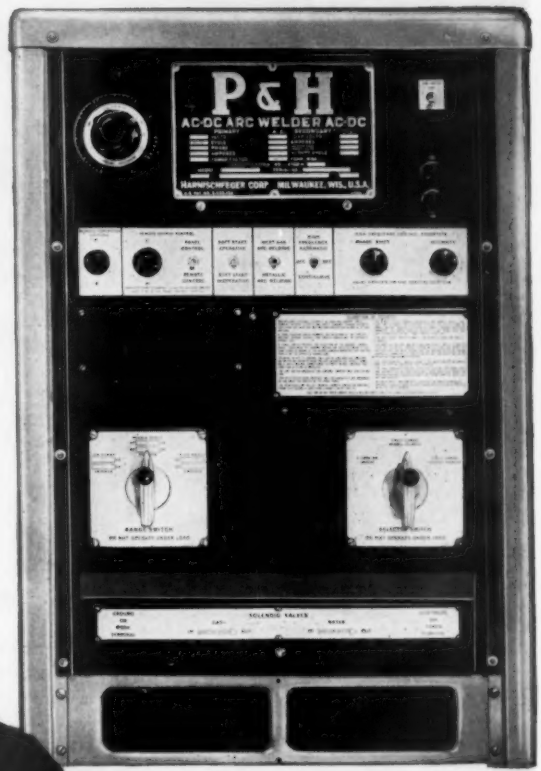
Stop burn through... eliminate craters!

New P&H welders provide

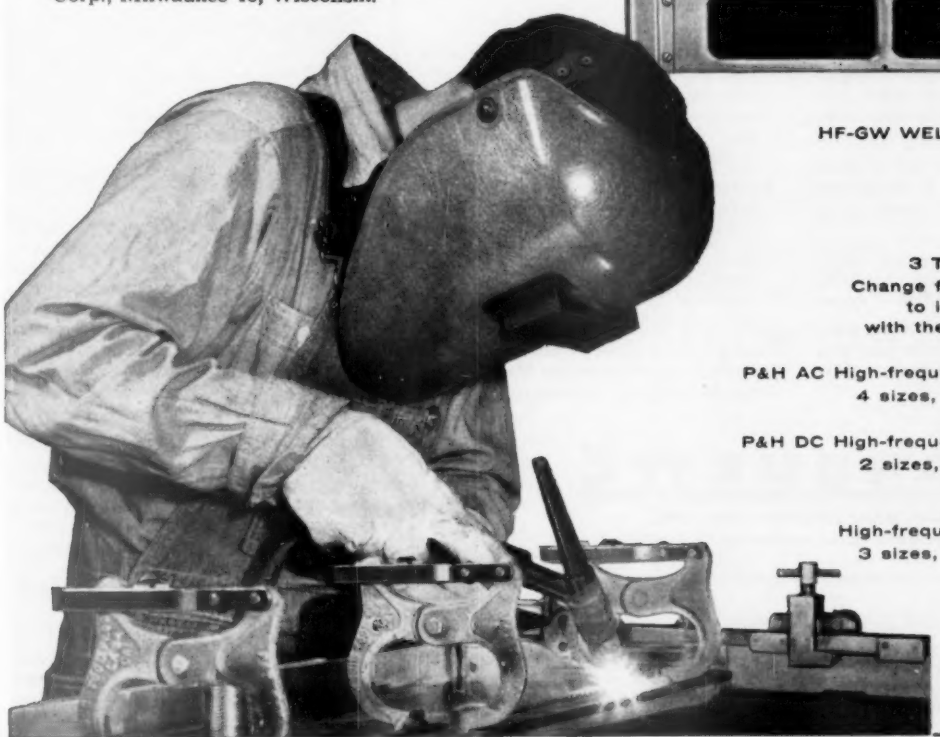
exact heat, perfect timing

for inert gas welding

Built-in high-frequency, gas, water, and spot-gun controls enable you to weld materials as thin as .005 inches without burn-through or craters! The new P&H welders give you P&H "Dial-lectric" control for fast micro-heat adjustment at the machine or by remote control. "Soft-start" device eliminates blasting — phase-shift and intensity rheostats speed arc-starting and stabilize arc intensity over each entire range, eliminate chopping. And for inert gas welding at its best, you can have P&H wave balance built into your machine at extra cost. Write for bulletin "HF Welders," Dept. 317B, Harnischfeger Corp., Milwaukee 46, Wisconsin.



P&H AC-DC
HF-GW WELDER SHOWN



3 Types—9 Models
Change from metallic-arc to inert gas welding with the flip of a switch

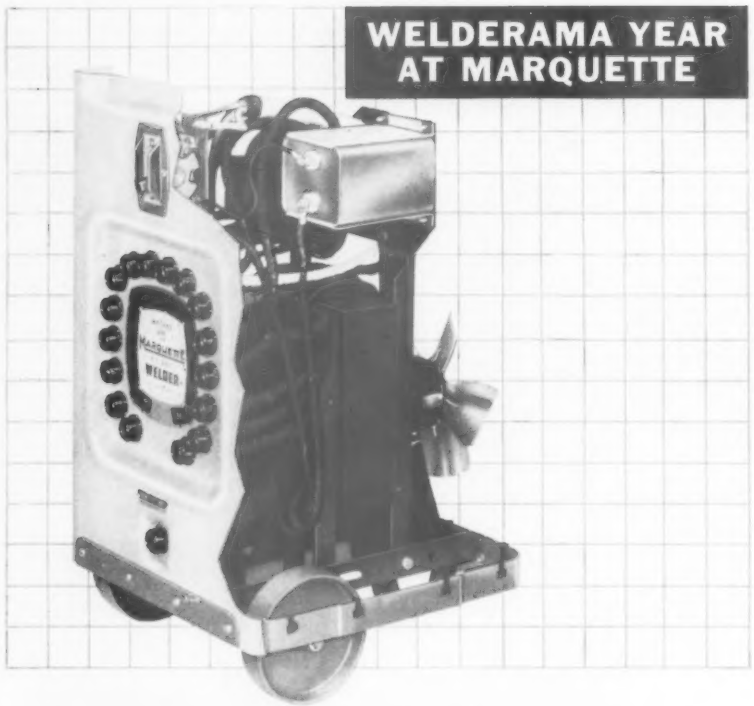
P&H AC High-frequency WELDERS:
4 sizes, 7 to 670 amps.

P&H DC High-frequency WELDERS:
2 sizes, 3 to 550 amps.

P&H AC-DC High-frequency WELDERS:
3 sizes, 5 to 670 amps.

P&H HARNISCHFEGER WELDERS • ELECTRODES • POSITIONERS

For More Information Circle No. 40 on Reader Service Card.



Looking into a new welder

The new MARQUETTE Series 94 A.C. Arc Welder combines the most modern engineering features with a super heavy duty transformer, providing these important benefits:

- Perma-Shield Fibre-Glass cabinet construction. This efficient, lightweight design eliminates "eddy current" losses; too, it's noiseless, rustproof and weatherproof.
- Extra-wide welding range of from 25 to 295 amps . . . or from lightest sheet metal to heavy steel plate applications.
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- Built to NEMA Standards for Industrial A.C. Welders. UL and CSA Approval. Series 94 Models carry full one-year guarantee.

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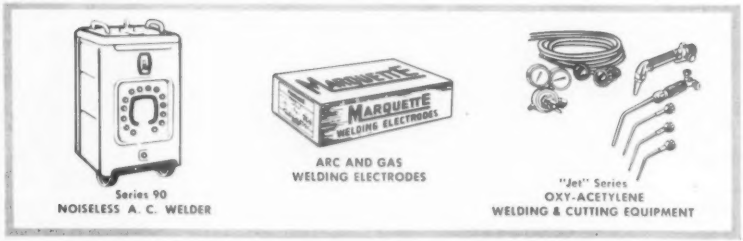

Series 90
NOISELESS A. C. WELDER

ARC AND GAS
WELDING ELECTRODES

"Jet" Series
OXY-ACETYLENE
WELDING & CUTTING EQUIPMENT

For More Information Circle No. 53 on Reader Service Card.

LIGHT-TIGHT WELDING GOGGLES made by Watchemoket Optical Company are featured in literature offered. Described and illustrated are Model No. 492 goggles with protected filter lenses, Stac-Vent ventilation, opaque black, soft vinyl frame and patented metal lock bar.
Circle No. 92 on Reader Service Card.

A VERSATILE WELDING PRESS which can be used for multi-spot, multi-projection, multi-cross and mash welding, hot upsetting and brazing is featured in literature from Ames Spot Welder Co., Inc. The high production press can be used to fabricate tubular, wire or any sheet metal product.
Circle No. 10 on Reader Service Card.

GRINDING WHEELS for the welding trade are described in a streamlined, 4-page catalog issued by Simonds Abrasive Company. Popular sizes and shapes and standard grain and grade specifications are shown for reinforced resinoid depressed center wheels and regular resinoid bonded straight wheels, flaring cup wheels and mounted wheels. Ask for Form ESA-299.
Circle No. 67 on Reader Service Card.

SILVER BRAZING DATA BOOK issued by Goldsmith Bros. Smelting & Refining Co. describes and illustrates company's complete line. Featured are random coils, strip, preformed rings; special shapes and fluxes.
Circle No. 38 on Reader Service Card.

A NON-KINKING HOSE manufactured by Hewitt-Robins is the subject of Bulletin 6-44. Explained is how company's Twin-Weld hose eliminates kinking and curling and why it is safer, neater, and easier to handle. Flame-resistant neoprene cover is described.
Circle No. 41 on Reader Service Card.

PRECISION CIRCLE CUTTING is a cinch with a new cutting attachment introduced by Ideas, Inc. Attachment fits on any cutting torch and can be used on vertical and overhead surfaces as well as for horizontal cutting.
Circle No. 93 on Reader Service Card.

A GUIDE TO SPOT WELDING issued by Thomson Electric Welder Company is a guide to proper machine selection. A comprehensive chart tells what size spot welder and which controls should be used on what combinations of metals.
Circle No. 94 on Reader Service Card.

EVERYTHING FOR RESISTANCE WELDING can be found in a catalog issued by Eisler Engineering Co., Inc. Described and illustrated is a wide assortment of electric spot, wire butt, seam, tweezer, gun and flash welders. Welding tips and accessories are also covered.
Circle No. 28 on Reader Service Card.

TUBULAR PROFILE CUTTER makes precision flame cuts on any pipe or tubing up to 7-inches O.D. Manually operated Woerner Model NTD described in literature is said to cut angles, miters, saddles, bevels, slots, notches and cams within .015-inch tolerances and give finished edges ready for welding. Power-driven models are also featured.
Circle No. 58 on Reader Service Card.

KELLER POWER HACK SAWS marketed by Sales Service Mfg. Co. are the subject of a complete 4-page bulletin. Described and illustrated are 10 different machines with capacities ranging from 4- by 4-inches to 10½- by 9-inches. Specifications and operating characteristics are given for both bench and floor models.
Circle No. 95 on Reader Service Card.

AUTOMATIC ARC WELDING MACHINERY made by Berkeley-Davis Incorporated is featured in technical literature. Described in detail and illustrated are an automatic dial feed welder, a standard stake fixture and two special welding positioners: cantilever- and offset trunnion-types.
Circle No. 96 on Reader Service Card.

A PORTABLE SPOT WELDER for sheet metal fabricators is featured in a 6-page, pocket-size folder issued by E. V. Nielsen, Inc. Power requirements, weights and capacities are given for three models. Standard and special replacement arms that are available are listed.
Circle No. 97 on Reader Service Card.

PROTECTION FOR RADIATION HAZARDS is available from X-Ray Monitoring Corp. Literature from the company explains why the company's film badge monitoring service is the sure, safe way to measure personal radiation and radio-activity exposure.
Circle No. 98 on Reader Service Card.

TWO AUXILIARY TOOLS that can be handy for welding shop applications are featured in a catalog sheet from Industrial Overlay Metals, Inc. Described and illustrated are a portable steel hardness tester that measures in the 25 to 65 Rockwell C scale and pocket microscopes which magnify up to 400 times.
Circle No. 99 on Reader Service Card.

Here, in one compact bulletin, is the information that can help you choose the right cylinders for transporting and distributing all types of high-pressure gases—including oxygen, nitrogen, argon, ethylene and carbon dioxide.

Here, too, are related the facts that show why *deep drawn* high-pressure gas cylinders are most likely to save you money on shipping charges, handling costs and maintenance.

Complete data are given—showing styles, sizes, capacities of cylinders, and ICC specifications which Hackney cylinders far exceed.

Whether you serve industrial or medical customers, you ought to have this new bulletin handy as a guide to quality and as an aid in ordering your Hackney cylinders.

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Gentlemen: Please send the new bulletin at once. We are interested in facts and prices of Hackney high-pressure gas cylinders for ☐ industrial, ☐ medical service; in quantities 1 to 24 ☐, 25 to 99 ☐, 100 to 499 ☐, 500 to 999 ☐, 1000 or more ☐.

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CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS
For More Information Circle No. 61 on Reader Service Card.

Tempilstik°

*temperature indicating crayons**

*Also Tempil° Pellets and Tempilaq° (liquid form)

Tempilstik°—a simple and accurate means of determining preheating and stress relieving temperatures in welding operations. Widely used in all heat treating—as well as in hundreds of other heat-dependent processes in industry. Available in 80 different temperature ratings from 113°F to 2500°F . . . $2.00 each.

Send for *free* sample Tempil° Pellets. State temperature desired . . . Sorry, no sample Tempilstiks°

Most industrial and welding supply houses carry Tempilstiks° . . . if yours does not, write for information to:

SALES DEPARTMENT

Tempil° CORPORATION
132 West 22nd St., New York 11, N. Y.

Circle No. 71 on Reader Service Card.

USEFUL LITERATURE *continued*

"300-M ULTRA HIGH STRENGTH STEEL" is the title of a new booklet issued by International Nickel Co., Inc. Numerous charts and tables are used in this 14-page booklet to call attention to superior qualities that make 300-M a commercially practical material for very high strength applications.
Circle No. 100 on Reader Service Card.

ELECTRODE DRESSING CUTTERS marketed by Severance Tool Industries, Inc. are the subject of a catalog sheet. Described and illustrated are cutters for use with portable air or electric tools.
Circle No. 101 on Reader Service Card.

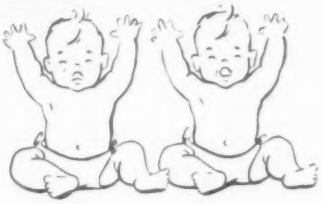
A NEW LINE OF PRESS-TYPE spot and projection welders is featured in Brochure P59 offered by Federal Machine and Welder Company. This illustrated, colored booklet gives complete description and includes specifications covering four available sizes, ranging in capacity from 30 to 500 KVA.
Circle No. 102 on Reader Service Card.

A READILY MACHINABLE and high-temperature heat- and shock-resistant ceramic suitable for use at temperatures up to 2200°F is featured in a one-page data sheet from Duramic Products, Inc. Bulletin 118 describes the company's Duramic Grade HT-2-M ceramic and tells how and where it is used. Typical uses include induction heating jigs, welding locators and torch and furnace brazing fixtures.
Circle No. 103 on Reader Service Card.

A TWO-COLOR ENGINEERING DATA SHEET (Number 4-A) issued by the Stainless Processing Division, Wall Colmonoy Corp. discusses a 0.005-inch thick flexible Nicrobraz brazing sheet for high temperature service honeycomb applications. Advantages, application recommendations and recommended brazing atmospheres are included. Sizes and weights, as well as wetting and flow properties, are discussed.
Circle No. 104 on Reader Service Card.

HOSE COUPLING AND FITTINGS for use on every type of industrial rubber hose are featured in a new 8-page bulletin just issued by Hose Accessories Co. LE-HI condensed catalog No. 34 is printed in color and well illustrated. It features descriptions and illustrations of several new products added recently to the company's line.
Circle No. 105 on Reader Service Card.

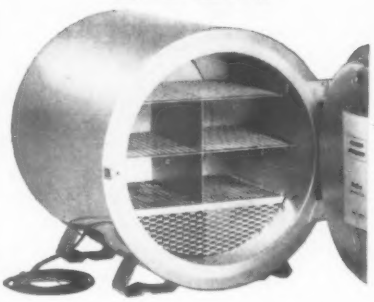
YOU GOTTA KEEP 'EM DRY!



Moisture "messes up" electrodes, too, cuts welding profits.

End costly reworks by drying rods in

DryRod® OVEN



Mineral coated electrodes are *thirsty*. The instant you unpack them they start soaking up moisture . . . within 2 hours often as much as 13 times US allowable specifications. Moist rods cause porosity, under-bead cracking, rough welds, etc. Rod scrap runs high. Production slows down. Reworks eat up profits.

Storing rods in DRY-ROD OVEN prevents such losses, insures faster, finer workmanship at less cost.

Write for new literature on latest rod-drying methods. "Dry Rod as Standard Welding Equipment."

PHOENIX PRODUCTS COMPANY
4731 N. 27th St. • Milwaukee 9, Wis.
Circle No. 60 on Reader Service Card.

WELDING SHOW HIGHLIGHTS

continued from page 63

Cutting machines featured ranged from Linde's Oxweld CM-60, a fully automated, unlimited-capacity shape-cutting machine, to Messer Cutting Machines' featherweight portable oxygen cutting unit. Messer also introduced a cutting machine with pilot working from reduced scale (1:10) drawings.

A versatile silver-bearing brazing-type alloy with lower melting temperature (1135°F) and high tensile strengths (up to 80,000 psi) was introduced by Eutectic Welding Alloys Corp. The alloy has excellent wetting and thin flowing properties. It gives corrosion-resistant joints with high electrical conductivity when joining copper, brass, bronze, steel and stainless steel or dissimilar combinations.

Curtiss-Wright Corp. introduced a filler metal and companion flux for low temperature, high strength titanium torch soldering.

Marquette Mfg. Company's contribution was a Mid-Jet welding and soldering outfit and an all-purpose assortment of low temperature soldering and brazing alloys.

NON-DESTRUCTIVE TESTING equipment manufacturers left nothing to chance.

X-ray equipment for weld inspection was introduced by several manufacturers: Curtiss-Wright displayed a 31 Mev dual beam stereo Betatron which penetrates steel up to 20-inches; Westinghouse Electric's X-Ray Division featured its new Fluorex image amplifier which increases the light intensity on fluoroscopic screens as much as 200 times that of conventional equipment, making it possible to see greater thickness of metal with better detail and sensitivity; Balteau Electric introduced a 180KV 5MA X-ray unit for 360° coverage as well as for conventional applications.

Gamma radiography wasn't neglected; nor was ultrasonic inspection. Picker X-Ray introduced a new iridium camera for pipe weld inspection, while Sperry Products featured its UR600, an ultrasonic reflectoscope for locating surface and internal defects, differences in structure and physical properties for measuring thicknesses.

Magnaflux Corporation contributed a new, battery-operated unit which measures electrical conductivity from 8 to 105 percent IACS. Measuring electrical conductivity with the unit permits inspection of welded and brazed joints.

Temperature indicating products were not overlooked. Tempil Corporation added temperature indicating sticks, pellets and liquids for 294, 306, 319, 331 and 344°F. Other new pellets were introduced for 525 and 650°F ratings.

Curtiss-Wright introduced a complete new line of temperature-indicating pigments.

For More Information Circle No. 49 on Reader Service Card.

ANNOUNCING A
NEW METHOD OF CONNECTING WELDING CABLE
T. P. C.*
PAT. PENDING
*THREADED POWER CONNECTION

Trim insulation — allow ¼" to extend through sleeve
Slip on threaded sleeve
Crimp sleeve with Swedg-on tool

ASK YOUR HI-AMP DISTRIBUTOR TO EXPLAIN
THIS NEW-EASILY ATTACHED-COOL RUNNING CONNECTION
LENCO, Inc. P. O. Box 189 Jackson, Mo.

Flood FIBER GLASS WELDING HELMETS
For Safety, Comfort and Economy

These seamless fiber glass units (of thermo-setting, polyester resin) are compression-molded and stoutly reinforced to afford maximum protection. All are fitted with a new ratchet type head gear which adjusts to size with the flick of the fingers. Headgear material (of high impact plastic) is smooth, easy to clean and unaffected by chemical reaction.

NEW DESIGN ADVANTAGES
1. Lighter weight for more comfort.
2. A smoother and stronger shell.
3. Easier cleaning and sterilizing.
4. Non-warping moisture-proof construction.
5. Superior resistance to heat.

No. 51-8F-P14

No. 53-8F-P14

No. 51-2F-P14

Enjoy real savings with Flood's
1000-HOUR COVER LENS
Outlasts 125 glass lenses. Reduces eye fatigue. Safer because shatter-proof.

No. 53-2F-P14

See Your Distributor or Write:

Flood Always FINEST QUALITY FAIRLY PRICED
FLOOD SAFETY PRODUCTS CO.
3037 WEST LAKE STREET, CHICAGO 12, ILLINOIS

For More Information Circle No. 34 on Reader Service Card.

STAINLESS STEEL welding scale & oxide go off with

OX-OFF

LIQUID CHEMICAL FORMULA 536

Costs far less than obsolete hand methods.

No more costly, time-wasting hand compounding, grinding and sanding. OX-OFF 536 acts *in seconds.* Just dip small stainless steel pieces in 140°F bath — OR stroke large pieces with electric applicator (below) . . . welding scale and oxidation go fast and completely from surfaces and crevices.

ELECTRIC APPLICATOR

For large assemblies where dipping is impossible. Operates on 110-120 VAC, 50-60 cycles.

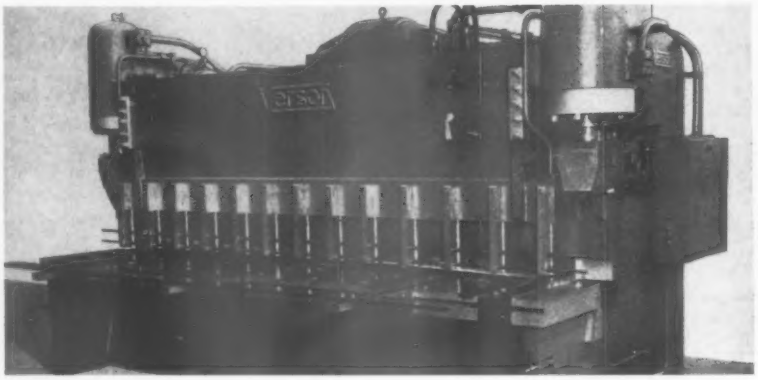
Write for Tech Bulletin IW-6
or see your welding distributor.

Chemclean Products Corp.
15-08 121 St., College Pt. 56, N. Y.

MANUFACTURERS OF INDUSTRIAL CHEMICALS AND SPECIALTIES

Circle No. 22 on Reader Service Card.

NEW PRODUCTS



New Line Of Hydraulic Shears

A new line of hydraulic shears is now available from Verson Allsteel Press Company. Shear capacities range from 8 ft. lengths of ⅜" mild steel, through 12 ft. lengths of 1½" mild steel. Special capacities are available.

The hydraulic shears are said to produce a better sheared edge than can be obtained with a mechanical shear of comparable capacity. Shears are designed with a minimum shear angle of $1\frac{1}{16}$" per foot. This is said to eliminate curling of the sheared piece when working with light gauge materials.

Power-operated back gauges are controlled and operated from the front, and are easily accessible to the operator. Shears are also equipped with a front gauge and a squaring arm for precise alignment of stock.

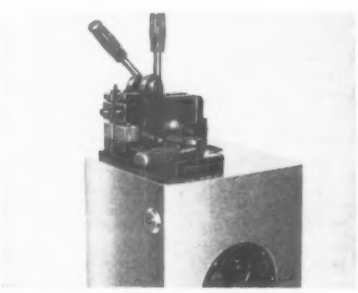
Ball transfer in the bed allows easy movement of stock. When properly aligned, stock is held in place by hydro-pneumatic hold downs. Knife guards provide operator safety. Shear blades are readily accessible from the rear, permitting easy replacement.

For More Information Circle No. 115 on Reader Service Card.

Portable X-ray

A 50-pound industrial generator that will pass through a 6-inch opening, yet will radiograph 1¼ inches of steel in 45 seconds has been announced by Picker X-ray Corporation. The Andrex 140 KV unit is designed for one man inspections of pipelines, pressure vessels, etc., and for operation on almost any power supply line. The 55-pound control features meters and stepless controls which monitor to offset line voltage fluctuations.

Circle No. 116 on Reader Service Card.



Precision Butt Welder

A welder that helped construct the Mackinac suspension bridge is now available for shop use and light production applications, according to Peer, Inc., the manufacturer. Their Model B-1 can be used for lengthening screws, pins and rods; and to join saw blades, metal bands and wire reels. Strong, aligned joints are made by inserting pieces in clamping dies, operating clamping levers, and pushing the 'operate' button.

Circle No. 117 on Reader Service Card.

FACTS AT YOUR FINGERTIPS: *Do you want full information on the latest welding products shown on these pages? Just circle the appropriate number on the bound-in readers service card and you'll get it.*

For More Information Circle No. 86 on Reader Service Card.

Three of a Kind

You'll have a good hand everytime . . . when you choose your welding gloves from the new OXWELD line.

There are three new styles with "royal flush" protection and comfort. There are three new prices that keep the "table stakes" in your league.

Now you can choose the exact style and price to fit your needs as well as your pocketbook.

Ask to see the complete line today. It's a good bet that one of the three is the glove you've been looking for.

♡ OXWELD All-Purpose Glove
No. 748F01 . . . . . per pair $2.20

"Flextan" leather, bell shaped fabric cuff. Side split, LM weight, chrome tanned, treated to resist the effects of heat. Cuff is 12 oz. duck treated with vinyl plastic, sewn inseam and overedged at top of gauntlet. Each pair sealed in clear, transparent polyethylene bag.

♤ OXWELD Premier Welding Glove
No. 742F01 . . . . . per pair $3.30

Deluxe Model, highest quality "Flextan" leather. Seamless back, Montpelier type, continuous thumb, with gussets between first, second, third, and fourth fingers. Welted entire length of glove on both sides. Welts full ¼ inch wide. Each pair packaged in heavy manila envelope.

◇ OXWELD Fabric Welding Glove
No. 714F00 . . . . . per pair $1.10

A hard-wearing, Flame-resistant, washable glove of 24 oz. terry cloth—two ounces more than other gloves—lasts up to 10% longer, provides greater protection against sharp cutting edges, more protection against dry heat, and saves you money in replacement costs.

In addition to these gloves, your nearby LINDE supplier carries a complete line of job-proved, quality equipment and accessories for every oxy-acetylene welding and cutting need. See him today for prompt service. Or write for his name and address to LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd St., New York 17, N.Y.

Linde

UNION CARBIDE

"Linde," "Oxweld" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

For More Information Circle No. 52 on Reader Service Card.

For More Information Circle No. 86 on Reader Service Card.

KWIKFLUXER *Ends...*

Unbreakable Plastic Squeeze Dispenser

- MESSY BRUSHES
- STICKY FINGERS
- SLOPPY FLUX APPLICATIONS

- Ready for Use
- Fast & Economical
- Waste Free • Refillable

KWIK FLUX 54

Patented

FOR SILVER BRAZING AND HARD SOLDERING

Has double penetrating power and miracle flow. Protects work. Makes more complete brazes especially in those long, deep joints. Low flow point saves heating and brazing time. Unexcelled for joining all ferrous, non-ferrous and precious metal alloys. Proven best for brazing carbide tips and tools. Can be used with all types of heating applications . . . direct, indirect and induction heating. Greater protection saves cleaning time . . . speeds work . . . cuts costs!

The KWIKFLUXER Applicator Container is made of pliable plastic with screw cap tip, ready for use. Pierce tip, squeeze and apply to work. Small opening eliminates waste from rapid evaporation and hardening. It's quick, convenient and refillable.

KWIKFLUX No. 54 in the 12 oz. KWIKFLUXER Squeeze Dispenser, only $1.60 each.

If your welding supplier is out of stock, order direct.

Please include name of your supplier.

SPEC **SPECIAL CHEMICALS CORP.**

100 SOUTH WATER ST., OSSINING, N. Y.

NEW PRODUCTS *continued*

Tig Conversion Unit

Miller Electric Mfg. Co. is now offering a tungsten inert gas conversion unit for their AEA series of gasoline engine driven welder/power plants.

The new device connects readily to welder and delivers continuous high frequency or high frequency for arc starting only. The company claims outstanding welding characteristics and stabilized arc result from an exclusive 2-range balancing resistor.

Unit is complete with gas timer, gas valve, 4-gallon water coolant system and RHS-2 hand switch for arc starting.

For More Information Circle No. 131 on Reader Service Card.

Alloy Plate Hooks

Designated by the manufacturer as Accoloy Plate Hooks and fabricated from type 8620 alloy steel, these new, high strength hooks can be utilized with various chain assemblies, as well as with ACCO's Kuplex Sling Chain. In addition, they can be furnished on the ACCO Registered Slings. Manufactured by American Chain Division, American Chain & Cable Co., Inc., hooks are intended for use in handling plates, flats and structurals.

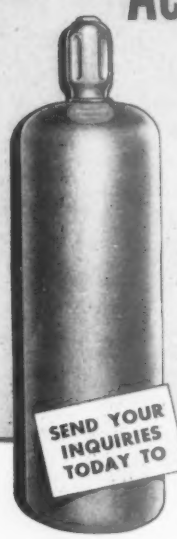
Made to accommodate ¼-, ⅜-, ½-, ⅝-, ¾-, and ⅞-inch chain sizes, the hooks are proof-tested to the same values as corresponding chain and are, therefore, of equivalent working load limit. Heat-treated and tough, the hooks have a hardness of approximately 250 Brinell.

For More Information Circle No. 132 on Reader Service Card.

LOOKING FOR THE BEST? *Buy*

INDEPENDENT

Acetylene Cylinders



- Unconditional Guarantee
- Proven Filler - No "Spitting"
- No voids - No soft Spots
- Seamless Cylinders for Durability
- Alloy shells for Lighter Weight
- Cylinder Shells - Meet all ICC Requirements
- All Cylinders "WHEELABRATOR" cleaned
- Standard Sizes in Stock - Special Sizes on Request

Independent also manufactures Low Pressure Acetylene Generating Plant Equipment.

SEND YOUR INQUIRIES TODAY TO

INDEPENDENT ENGINEERING COMPANY, Inc.

Manufacturers of

CONSULTING IDECO DESIGNING RESEARCH

CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE - OXYGEN - NITROGEN - ARGON

O'FALLON 2, ILLINOIS

For More Information Circle No. 43 on Reader Service Card.

Self-Identified Coils Will End Wire Mix-Ups

An exclusive development, providing positive coil identification of Page automatic welding wire, has been announced by the Page Steel and Wire Division, American Chain & Cable Company, Inc., Monessen, Pa. Designed to end costly wire mix-ups and save money for the user, each coil of Page automatic welding wire now has the grade stamped on the inside of the liner, insuring positive, instant identification.

In addition to the stamped grade identification, liners on No. 2 coils are color coded—the colored stripe on the inside of the liner indicates the grade. This feature makes identification double-quick and foolproof.

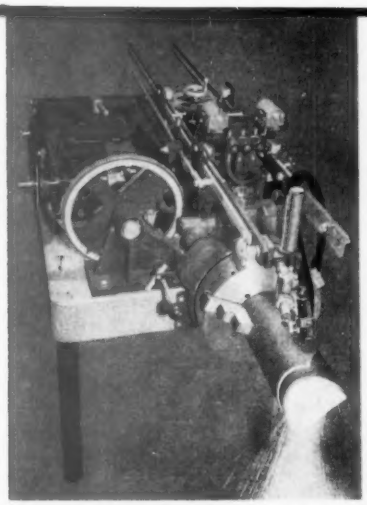
Circle No. 59 on Reader Service Card.

Filler Wires On Two-Pound Spools

The International Nickel Co., Inc. is now producing a variety of its filler wires on new, compact two-pound spools that can be attached directly to lightweight, compact MIG welding guns.

Capable of joining several Inco nickel alloys as well as most dissimilar alloy combinations, these filler wires are now available on small spools: Inco-Weld "A", "67" 70/30 copper-nickel, "62" Inconel, "61" nickel and "60" Monel.

Circle No. 119 on Reader Service Card.



Contour Cutting Machine

A new and improved contour-cutting machine announced by Steffan Manufacturing Corporation is reported to save up to 75% in time and material for joining pipe and fabricated parts.

The Steffan Automatic Contour Cutter is designed and built to practically eliminate the use of forged fittings. Initial set-up takes as little as 15 seconds. Cutting at a rate of 20 ipm, a 6-inch aluminum pipe can be contoured in only 20 seconds.

Pipe is clamped into a 3-jaw chuck and pertinent information fed into the controlling mechanism. Pushing a button activates the action and the most complex contour is automatically cut without the use of templates, layouts or patterns.

Sections requiring straight, mitered or contoured ends are quickly prepared with proper bevels for welding. The cutting head is equipped with an oxyacetylene torch for cutting carbon steel or a Heliarc torch for cutting aluminum, stainless steel, copper, cast iron, magnesium, and high alloy steels.

Circle No. 120 on Reader Service Card.

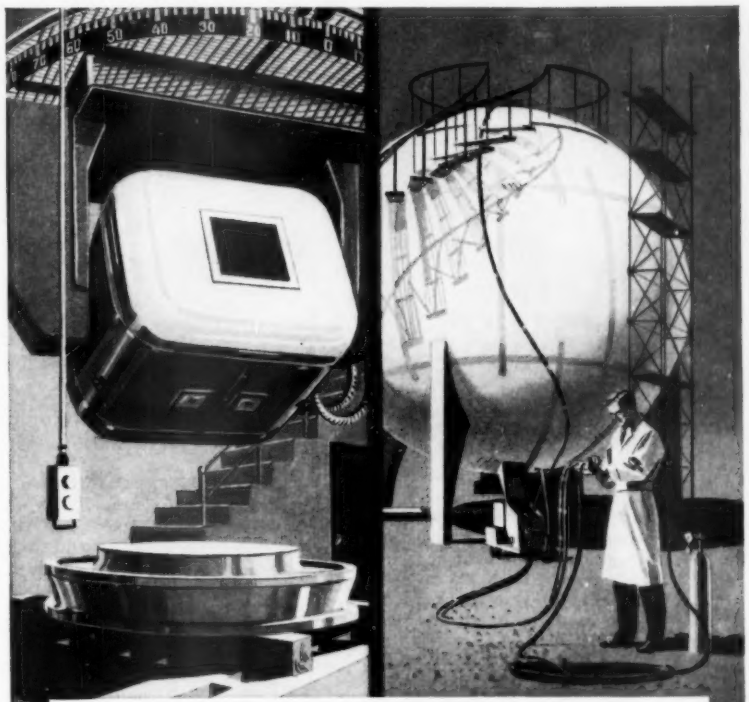
Tig Welding Package

Complete, remote, tungsten-inert-gas shielded arc welding facilities are now available in one compact, lightweight package from Hobart Brothers Co.

Named TIGPAK, the unit is designed to eliminate the need for moving heavy arc welding equipment and extending water lines for remote "TIG" welding jobs. It may easily be carried, hoisted, or trundled to the job while the heavy welding machine is left behind, and connected only by the usual welding cables.

The unit was developed specially for AC-AC gasoline engine-driven welders of 200 or 300-ampere capacity. However, it can also be used with DC gas drive welders provided a source of 110-volt AC power is available and with electric powered DC, AC or AC/DC motor-generator sets, rectifiers or transformers by using a special optional adapter kit.

Circle No. 121 on Reader Service Card.



Radiographic Equipment for all your inspection requirements:

STEEL 20" THICK OR WELDS 100' UP

Whatever your inspection requirement, Curtiss-Wright has precisely the X-ray or Isotope equipment you need. From a 31 Mev Dual Beam Stereo BETATRON which penetrates 20 inches of steel to a 30 kv X-ray machine for ¼ inch aluminum, Curtiss-Wright offers inspection equipment and engineering services for every material and thickness range. In addition, Gamma Isotope equipment such as the PUFF CAMERA* makes it possible to inspect hard to reach tanks, pressure vessels, structural steel, ship hulls, complex castings and piping of various sizes and shapes. In this Radiography technique the source is propelled by compressed air through special cable up to 100 feet in length in about 6 seconds. *Reg. applied for

COMPLETE RADIOGRAPHY EQUIPMENT & SERVICES

Gamma Ray Cameras and Sources • Field Portable X-Ray Machines
Broad Beam Stereo Betatrons • Gamma Sentry (Radiation warning)
High Intensity Film Illuminators
Training Facilities and Application Studies

PRINCETON DIVISION
CURTISS-WRIGHT
CORPORATION · PRINCETON, N.J.

WRITE FOR LITERATURE

In Canada contact CANADIAN CURTISS-WRIGHT LIMITED, 1980 SHERBROOKE STREET WEST, MONTREAL, P.Q., CANADA
In countries other than U.S.A. and Canada contact
EXPORT DIVISION, CURTISS-WRIGHT CORPORATION, 50 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK

For More Information Circle No. 24 on Reader Service Card.

Circle No. 1 on Reader Service Card.

ACORN

BENDING BLOCKS or WELDING PLATENS

Semi-steel Blocks for layout, welding assembly work, etc., with machined working surfaces; also tools and accessories, including a full line of clamps, drift pins and dogging devices. Standard and special stands can be supplied. A 4-unit set-up, joined and mounted on stands, is shown above.

WRITE TODAY FOR LITERATURE

ACORN
IRON & SUPPLY CO.
Delaware Avenue at Poplar Street
Philadelphia 23, Pennsylvania

TILLMAN
GLOVES-GARMENTS

WELDORS BUY FROM YOUR DEALER

WELDING GLOVES MITTENS AND GARMENTS NOW IN POLY BAGS

BRAZILIAN DEERSKIN
THE "STAY SOFT" LEATHER
GLOVES AND MITTENS

John Tillman & Company
1561 W. 19th St.
Long Beach, California

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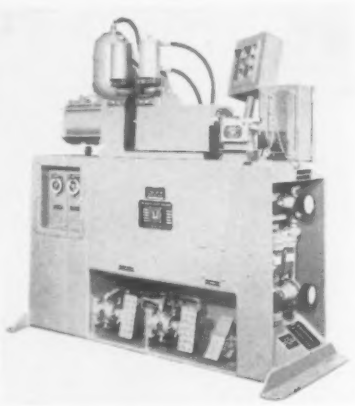
NEW PRODUCTS *continued*



Universal Butt Welder

This new 20 KVA machine is designed for the high speed welding of SAE 4130 rods and other high alloy steels. A special feature is the friction-free operation of the moving platen on ball bearings.

The "Electro-Weld" Universal butt welder is a single phase unit operating on 440 volts. It is equipped for the automatic control of all phases of the welding operation, including a hydraulic flash metering device and extra retraction for annealing.

Manufacturer is Electric Arc, Inc.

Circle No. 122 on Reader Service Card.

Clamping Fixture For Welding Positioners

A new standard easy-to-use clamping fixture for welding positioners is now available from Worthington Corporation.

Known as "Quickset Jaws" this new product reduces set-up-time, increases on-the-job safety (work object cannot fall out with safety clamp holes feature), and performs as a jig, fixture, or clamping component.

Worthington Quickset Jaws fit all positioner face plates, tilt tables, headstocks or tailstocks and are available in four sizes, 2000 lb. to 30,000 lb. capacities.

Circle No. 123 on Reader Service Card.

Electric Starter For Engine-Driven Welders

Miller Electric Mfg. Company's AEA series gasoline engine-driven welder/power plants are now offered with optional electric starters. New system is powered by a 12-volt battery with Bendix drive automotive-type starter.

Onan 12.9 hp engine and other components that combine to deliver 225 amps AC welding current on 100 percent duty cycle remain unchanged.

New model designations are AEA-200-E and AEA-200-LE.

Circle No. 124 on Reader Service Card.

Circle No. 19 on Reader Service Card.

BECKER
Keen-Cut Electrodes
for use in

CARBON ARC-AIR JET GOUGING

KEEN-CUTS—for the best characteristics of carbon and graphite in a carbon arc cutting electrode. Higher current capacity . . . longer life . . . shorter cutting time . . . greater material removal . . . smooth surface gouge . . . controllable accuracy . . . hot stable cutting arc . . . elimination of smoke and gases.

And they're low in cost. Try BECKER KEEN-CUT ELECTRODES—black or copper coated, standard diameters, 12" lengths in 150 to 1400 amp. range—for the most efficient, labor-saving electrode in carbon arc compressed air cutting.

A COMPLETE LINE OF CARBON AND GRAPHITE WELDING SUPPLIES—carbon and graphite electrodes, carbon rods and plates, welding paste, graphite cores and chills, graphite powder and particles of any mesh.

Write for Catalog

BECKER BROTHERS CARBON CO.
3442 South Laramie Ave. • Cicero 50, Illinois
Telephone: BI 2-1260 • Chicago

You Will Like Them Better
Alweld
CYLINDER TRUCKS

Check these features

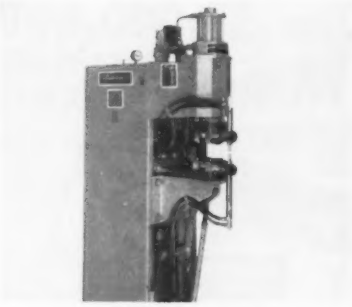
- Rugged, tubular steel construction
- Buggy handles for easy maneuvering
- Curved cradles and lock-type safety hooks
- Rubber tired or steel wheels
- Attractively finished

5 Models For 1 or 2 Cylinders

Stocked by nearly 100 independent dealers. Write for bulletin and name of nearest servicing dealer.

Welded Truck & Specialty Co.
1306 DIVERSEY PKWY. • CHICAGO 14, ILLINOIS

Circle No. 81 on Reader Service Card.



New Press Welders

An all new standard line of press type resistance welders has been introduced by the Federal Machine and Welder Company. Available in four sizes (30 to 500 KVA), each size is available as a spot welder, a projection welder or a combination welder in a range of standard throat depths, electrode forces and transformer sizes. Features: Slim design, anti-friction slide, and integral transformer and lower arm.

Circle No. 125 on Reader Service Card.

Hard-Facing Electrode For Severe Abrasion

Stoody Company is now marketing Stoody 2134, a high alloy hard-facing electrode with high resistance to extreme abrasion, medium impact and high compressive loads. Field experience indicates that Stoody 2134 may be expected to provide service life surpassed only by the tungsten carbides.

A tubular electrode with a dipped graphitic coating, Stoody 2134 contains approximately 43% alloy materials. Deposits bond readily to carbon, low alloy and manganese steels. They are magnetic, non-machinable, nonforgeable and will not respond to heat treatment.

The new rod has excellent arc characteristics on AC and DC, straight or reverse polarity. Weldability and build-up are superior, efficiency is high and spatter loss is low. It may be applied in either stringer beads or wash passes.

Hardness ranges from 56 to 60 Rockwell C with a two-pass deposit on medium carbon steel. Water quenching from 1750° F increases hardness to 63-65 Rockwell C. Deposits will not work-harden.

Circle No. 126 on Reader Service Card.

Versatile Welding Press

To make full use of the production potential of resistance welding processes, Ames Spot Welder Co., Inc., has developed a versatile, high-production welding press. This one press can be used to fabricate tubular, wire or any sheet metal product. It can be used for multi-spot, multi-projection, multi-cross and mash welding, hot upsetting and brazing.

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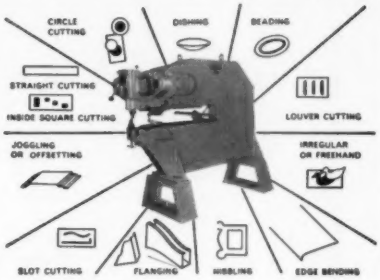

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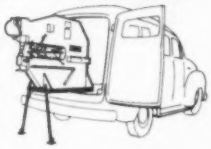

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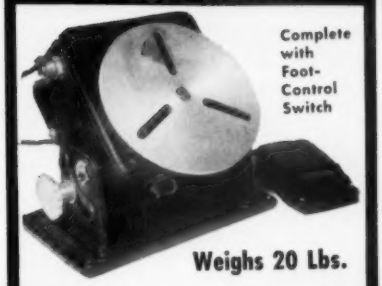

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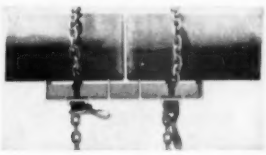

The JEWEL Pipe Clamp

. . . aligns and holds pipe for tacking. Two sizes: ½" to 8" and 8" to 16". Sturdy construction for hand usage.

The JEWEL Elbow Clamp

. . . lines up welding elbows from 2½" to 8" at right angles to the pipe and holds them until tacked.

The JEWEL Pipe Marker

. . . marks a perfect hole and saddle on any pipe up to 20".

The JEWEL Angle Clamp

. . . holds branch line at right angles to the main or headers. Takes any size main or branch from ½" to 12".

The JEWEL Flange Clamp

. . . lines up the flange face at right angles to pipe end and holds until tacked. Takes size from 2½" to 16".

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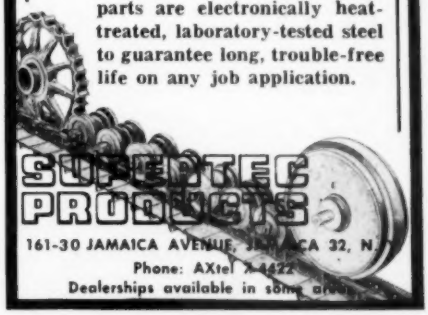

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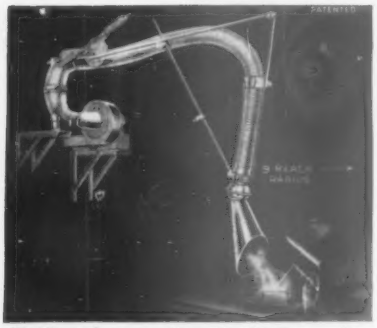
Remove Welding Fumes at the Source... with RUEMELIN FUME COLLECTOR



Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated AT THEIR SOURCE. Improves working conditions . . . lessens fatigue . . . paves the way for increased plant production. Especially helpful in winter months when windows and doors are closed.

Note the new spring-loaded counterbalance mechanism which makes Fume Collectors much easier to handle.

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Spotwelding Holders

Improved ejector-type spotwelding tip holders have been announced by Air Reduction Sales Co., as part of the Tuffaloy resistance welding line. They consist of two major parts, held together by a coupling: a plated copper alloy barrel and a brass head carrying the water hose connectors. An ejector tube, assembled to the head, ejects the welding tip when the entire head is forced to slide into the barrel. All parts are easy to replace after unscrewing the coupling.

This design eliminates the small ejector pin extending through the head which tends to deform in use and to permit dirt and water to leak around it. New design places two rubber water seals inside the barrel, well away from dirt and damage. Head pivots freely for greater ease of holder installation.

A threaded adapter holds the tip and is furnished as part of each holder. Made of RWMA class 2 alloy, it reduces wear and distortion of the socket. Known as Tuffaloy Series "E" holders, they are made with barrels 8" and 12" long, in 1", 1¼" and 1½" diameters and hold No. 1 and No. 2 Morse taper tips. Special sizes and special adapters are made to order.

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Plastic Insulation For Inert Arc Welders

"Glastic" electrical insulation developed by the Glastic Corp. is adding to the reliability of amperage range switches on new inert gas welding machines. The glass-reinforced plastic material is now being specified for switch mounting plates because of physical, electrical and thermal properties that meet the most recent requirements of welding machine manufacturers.

Grade UMM has these properties: resistance to warpage, heat and carbon tracking; flame retardance plus a self-extinguishing property; adequate strength and punchability for dimensional accuracy and manufacturing economy.

Grade UMM also offers advantages in fabrication, inventory and tooling. For instance, Miller Electric Mfg. Co., Inc., uses ⅛-inch "Glastic" for both light-duty and heavy-duty switches on its Gold Star AC/DC welders. For the heavy-duty switches, Miller simply uses two thicknesses of the ⅛-inch material.

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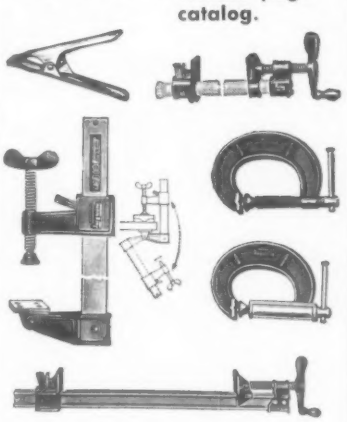

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Welding Engineer

The Armour Research Foundation has openings for experienced welding engineers. Applicants should have several years of experience in welding and brazing research with at least a B.S. degree in Welding or Metallurgy.

The Foundation is located on the campus of the Illinois Institute of Technology and encourages graduate engineering study through its education program providing tuition free graduate study, in addition to offering competitive salaries and liberal benefits including generous relocation allowance and vacation program.

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VALUABLE NEW DATA

During the last few years gas welding of plastics has been applied with particular success to a large and ever-increasing variety of constructions where it has proved invaluable. Information on this subject is rather scarce. This manual will be extremely valuable to practical welding people and to engineers who intend to incorporate plastic materials into their designs.

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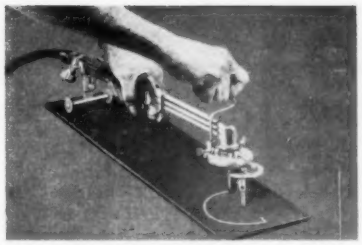

Precision Circle Cutting Attachment

A new tool that can be attached to any cutting torch is said to permit the cutting of precision holes in thick metal plate. Circular holes and solid disks, ½-to over 12-inches in diameter, are cut merely by turning a crank. Squares, rectangles and odd shapes of any size can be also formed accurately. The compact, lightweight Or-O-Co has a gear mechanism which makes cutting smoother and faster. Manufacturer is Ideas, Inc.

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Tong Ammeter Measures Fractions of an Ampere

Columbia Electric Mfg. Co., Cleveland 14, Ohio announces a new Type PB Tong Test Ammeter, primarily designed for measuring small amounts of direct current, in one-half ampere divisions, from 0 to 10 amperes. In addition, the Type PB can be used to read both AC and DC up to 20 amperes.

Measurements are taken easily and quickly by clamping the tongs around the electrical conductor, without breaking the circuit or insulation. Jaws can accommodate conductors up to ½ inch diameter. Two ranges are provided on one dial, 10-0-10 amperes for DC only and 0-20 amperes for both AC and DC. The 10-0-10 DC scale utilizes an "electrical zero" which is established by use of a magnetic source attached to the instrument.

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Jacket Vessels For Atmospheric Gases

A new Liqua-Guard System has been developed by Cambridge Corporation, subsidiary of Carrier Corporation, to reduce costs and increase efficiency in the storing and handling of atmospheric gases.

The system features a complete line of vacuum-jacketed vessels, vaporizers and associated equipment. It is said that the system provides a number of important cost and handling advantages. These include: 100% volume delivery, no residual gas loss; eliminates large number of high pressure cylinders; reduces handling and direct labor costs, reduces storage space; eliminates high pressure regulators; and increases the safety of personnel who normally handle many cylinders.

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THE ONLY IRON WORKER OF ITS KIND ON THE MARKET TODAY

No Grinding Necessary After Cut. One Stroke Cycle Clutch Operated by Hand or Foot.

The Bateman "Bantam" cuts 2" x 2" x ¼" angles and ¼" x 4" flats. Standard punches will fit this machine. The Coper will cope 1¼" through ⅛" material. It will punch ½" hole through ¼" material. With the clutch open, the Bantam will make 44 strokes per minute. It is made of high-grade cast iron, with the clutch, pin and dog made of hardened steel. The blades are made with tool steel. It is powered with a fly wheel and gear drive, and uses a small ¾ hp motor, 1750 rpm.

Bateman Bantam with punch ... $575.00
Shear only ... $495.00
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"ROYAL" HARDENING POWDER is safe to use. No Toxic fumes. Hardens low-carbon steels equally as well as cyanides.

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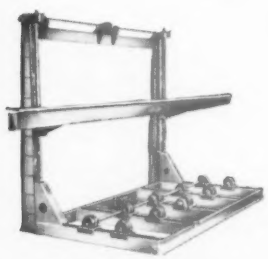
WEBB TANK PRODUCTION MACHINERY

The WEBB Corporation is the only manufacturer to offer a complete line of machines and fixtures built exclusively for the tank fabricator. Designed for use with manual, semi-automatic or full automatic welding processes. These machines are built for rugged use, using welded steel construction wherever possible.

In selecting a time-proven product of the Reed Equipment Division, you are buying guaranteed performance and a machine designed to do your work efficiently and economically.



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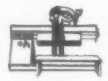
A complete line of Unit Type Track Supports and Turning Roll Fixtures can be provided for the welding of longitudinal and girth seams of cylindrical vessels, to 12' i n diameter and weighing up to 9 tons.

The unit is of all steel construction and all critical surfaces are machined to insure accuracy.

Unit Type Turning Rolls

Portable Turning Rolls

Automatic Welding Track Supports



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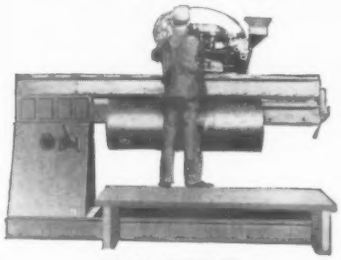
Cylinder Flange Offsetters

Assembly Fixtures



SEAM WELDER

These fixtures are widely used for single pass automatic longitudinal seam welding, using closed butt joints. This is designed primarily for cylindrical shapes and will also handle flat work and conical shapes. The material is clamped firmly in the jig in contact with the water cooled back up bar. Machine is of all steel construction.

FOR ILLUSTRATED LITERATURE WRITE DEPT C.

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REED EQUIPMENT DIVISION

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WELDING CLINIC

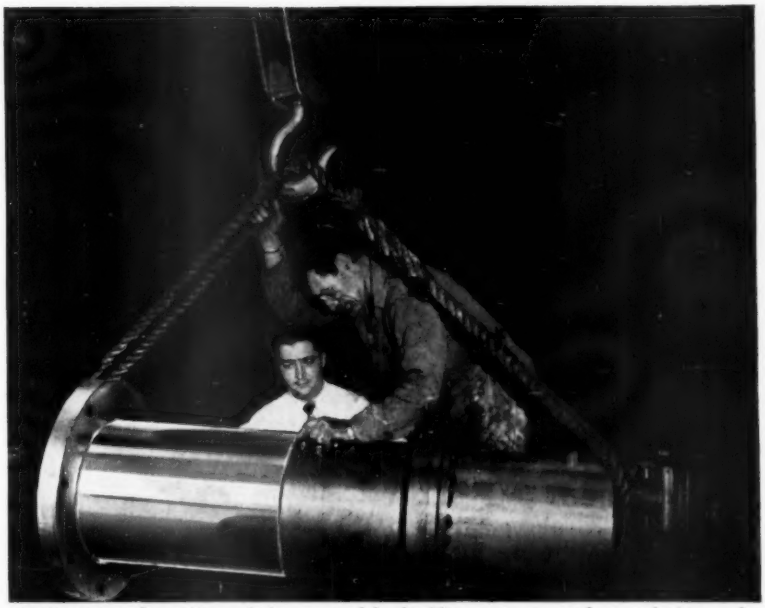
J. Imperati and R. F. Pulver, Welding Engineers
The American Brass Company, Waterbury, Conn.

Give worn equipment a new lease on life by surfacing with Anaconda Welding Rod

Anaconda Welding Rods are widely used in production and maintenance operations in the manufacture of all types of mechanical equipment and consumer goods. Familiar uses are the joining of iron and steel parts by oxyacetylene braze welding and the oxyacetylene braze-welding repair of broken machine parts. Of equal importance is their value in overlaying iron and steel to reduce the friction of sliding surfaces, and in rebuilding worn surfaces to get continued usage from parts that would otherwise be scrapped. Anaconda-997 (Low Fuming) Bronze, Tobin-Bronze 481, and Nickel Silver-828 Welding Rods are useful for many such applications.

Oxyacetylene braze welding is employed for these surfacing and rebuilding operations because of its speed, efficiency, and the convenience of using the equipment and skills available in most job shops. The many advantages, which result from the low temperatures of application, include:

1. ***Procedures which are virtually foolproof.*** The molten bronze automatically tins out and fuses to the base metal when the latter reaches the proper temperature. The rate of heat input is low enough to permit excellent control of the weld metal, and deposits are easily built up even in the vertical position.
2. ***Low residual stresses.*** The overall heating that accompanies the process reduces temperature gradients and minimizes distortion.
3. ***Economy in time . . .*** frequently repair welds are made without dismantling equipment.
4. There is ***no embrittlement of*** cast iron due to high temperatures. Machinability is retained and cracking tendencies are eliminated.
5. ***Absence of iron pick-up*** in deposits made on iron and steel, thereby avoiding hard spots and cracks.



WORN SPINDLE for a 60-ton lathe repaired by building up worn surface with Anaconda Nickel Silver-828 Welding rod by oxyacetylene braze welding. The estimated saving over the cost of a new spindle was nearly $2500.

Surfacing operations which are regularly done with Anaconda Welding Rods include the overlaying of bearing surfaces on iron and steel, and the rebuilding of worn items such as pistons, shafts, valve mechanisms, gear teeth, bearing surfaces, propeller and impeller blades.

Details concerning the type of rod and procedures recommended for surfacing various metals are available in Publication B-13, "Anaconda Welding Rods."

Free technical assistance. In most cases, Anaconda distributors can help you select the exact rod you need for your job. But if you have special problems, Anaconda welding engineers are at your service. For a copy of Publication B-13 with comprehensive information on Anaconda Welding Rods and procedures — or for technical assistance — write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5977

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